Complex Simulation Of Entrepreneurial Opportunity Emergence: The Case Of Nigerian Entrepreneurship

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by

Izuchukwu Benedict Okoye
MSc University of Greenwich, 2012
BTech Nnamdi Azikiwe University, 2005

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Supervisory Team:
Dr. Philip Evans (Supervisor)
Dr. Nandish V. Patel (Director of Study)
Declaration

This dissertation is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature and acknowledgement of collaborative research works and discussions. This work has not been submitted in substance for any other degree or award at this or any other University or place of learning, neither is it being submitted concurrently in candidature for any degree or another award.

Name: ..............................................  Signature: ..............................................
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Abstract

The current policy and public debate on the overall topic of entrepreneurship pays little attention to a more specific and developing property of entrepreneurship such as the emergence of an entrepreneur. This study examines the emergence of entrepreneurs through their behavioural interaction amongst one another and their environment. As a research methodology, agent based modelling was adopted for this research over system dynamics because, individual interactions (behavioural reactions/responses) between each entity and the immediate universe (environment) is the crucial unit for determination of the research results. In order to correctly capture this concept, interactions in the forms of personality trait attributes, social networking, technological acquaintance, environment (niche) and previous know-how (prior knowledge) were considered as the behaviours of study using agent based model. To achieve this, these entities were broken into their sub attributes in Bayesian probability model to provide statistical data for the behavioural analysis and a NetLogo simulation tool was used to reproduce a visual behavioural pattern of the agents (entrepreneurs) within an artificial universe. It is this process of using simulation to study entrepreneurial behaviour that is called “Simupreneurship” within this study.

The emergent patterns and behaviours implies that, entrepreneurship is an emergent process that takes form during and within the interactions between the agents and the environment. This suggest that variations in the smallest attributes of the agents could completely result in an unpredictable emergence. Hence, discernment process is not sufficient to explain entrepreneurship as in the literature. therefore, there is a necessity to move from cognition, illumination or insightful way of entrepreneurial thinking, to a more holistic and evolutionary system of thinking, this study adopted an emergent system of thinking. This infers that entrepreneurial ideas and opportunities emerge from a mindset that is a system function of entrepreneurial qualities, expertise, and knowledge. Hence, I presume that entrepreneurship is not ‘flat’ but instead emerges from a dynamic procedure.
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## List of Abbreviations

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<th>EOE</th>
<th>Entrepreneurial Opportunity Emergence</th>
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<tr>
<td>EK</td>
<td>Economic Environment</td>
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<td>PK</td>
<td>Prior Knowledge</td>
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<td>Social Network</td>
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<td>Environment</td>
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<td>Opportunity Emergence</td>
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<td>BN</td>
<td>Bayesian Network</td>
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<td>DAG</td>
<td>Directed Acyclic Diagram</td>
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<td>ABS</td>
<td>Agent Based Simulation</td>
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<td>System Dynamic Simulation</td>
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Research Thesis Road Map

Chapter 1
Research Introduction

Chapter 2
Customary Entrepreneurship

Chapter 3
Complexity and Entrepreneurship

Entrepreneurship and complexity Literature Review

Chapter 4
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Grand Literature Review

Chapter 5
Research Framework Concept

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Chapter 9
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Chapter 1: General Introduction to the Research

This research work is characterised by emergence. This is because, from the time of choosing the research topic through to the periods of literature review, changes and adjustments to the ideas and discoveries found in the literature have been recurrent. As the researcher’s knowledge in this area of investigation increases, there have been changes and adaptation of this research towards a more coherent conceptualization that effectively describes the entrepreneurial activities as is observed in reality.

The problem of entrepreneurial opportunity emergence is a philosophical one. This question was posed to the extant literature for explanation, but due to the intricate nature of the problem, the literature falls short of providing a reasonably reliable explanation. Nevertheless, in this research, I have tried to answer this philosophical question using complex system thinking. This best describe and provide insight into the nature of the complex attributes of the subject of study here.

In an attempt to answer the philosophical question posed by the findings from the literature, I employed Bayesian probability model to demonstrate and study the concept. The construct was found to be totally in agreement with the theory of deferred action which was postulated by (Patel, 2006). Because the process of entrepreneurial opportunity emergence requires re-organisation, re-focusing, and re-orientation of aims which is a deferred behaviour.

During the course of this research work, few papers were published as a direct outcome from the research process. They include:


1 Introduction

Entrepreneurship is a state of mind, thinking and acting that is opportunity fixated, that is built on methodology and balanced by leadership style (Timmons, 1999).

Individuals ask me constantly, by what means would I be able to end up a fruitful business person? What's more, I have, to be completely forthright: It's one of my slightest most loved inquiries, in light of the fact that in case you're sitting tight for another person's recommendation to end up a business visionary, chances are you are not one (Michael Dell, n.d.).

While conventional studies on the sources of productivity growth focus primarily on existing firms and management practices, recent literature has witnessed a growing interest in the contribution of new ventures and the role of entrepreneurs driving these new ventures (Menon 2002; Kogut, Bruce and Zender 1993). What is entrepreneurship without opportunities, or the emergence of opportunities? There will be no talk of entrepreneurship, its stages or processes, goals, features, or impact without the inevitable mention of opportunity emergence. Do firms emerge? Do entrepreneurs emerge? Is the concept of a firm created or discovered? Since entrepreneurs are the backbone of enterprises, it is important to study entrepreneurship.

This research asserts that, entrepreneurship is the behaviour of people, economies and the response of the society to the varying behaviours. A proper study of this characteristics is not accurate without an examination of the properties that bring about this variations. The personalities are classified as agents, while their economies and societies as environments that somewhat determines the actions of the agents. To setup this scenario, a simulation technique is deemed proper and efficient in handling the technical concepts of this research hence, the “Simupreneurship”.

This research provides an understanding of opportunity discovery as argued by some entrepreneurs or creation as is the view of some other entrepreneurs. Opportunity discovery has not been sufficiently described as well as the processes that bring it about. Therefore, the literature discussions and views are highlighted capturing both its academic fundamentals and the nature of the undertaking as obtains in relevant extant literature. In doing this, it is important to understand that entrepreneurship is not a
straightforward endeavour, rather it involves a variety of entrepreneurial diversity which includes:

1. New firms seeking to bring innovation to market versus firms that are making an effort to replicate what has been done previously by others.
2. Opportunity-seeking versus necessity driven start-ups.

The researcher developed a critical thinking approach termed “Simupreneurship” in attempting to understand and explore entrepreneurship better. Simupreneurship is the terminology the researcher has used to describe the study of entrepreneurship using simulations. Thereby modelling an artificial entrepreneurial universe in which the characteristics of agents (potential entrepreneurs) are closely studied. Deferred action theory seems to have described deferred systems which perfectly suits the platform needed to implement the proposed simupreneurship. In Chapters 6 and 7, a more detailed application of these concepts is described.

At the heart of the study of entrepreneurship are the discussions on the processes of opportunity discovery or creation (Shane 2000b; Lumpkin and Lichtenstein 2005; Baron and Ensley 2006). However researchers in this field have only recently begun to investigate how “entrepreneurs think”. Their terminology for this cognitive process that is, entrepreneurial cognition, has evolved with the following explanations, Entrepreneurs use simple mental models to make sense of hitherto distinct information that helps them to identify or invent ideas which translate into an opportunity (Baron et al. 2006; Baron 2004).

No organizational structure or business may be well explained except it is set in its elemental and theoretical framework. Every description and knowledge of what an enterprising initiative is, and what it may have achieved or otherwise, must clarify this. There is no debating the fact that these perceptions of free enterprise, intrapreneurship, and novelty in terms of being jointly inclusive (Gündoğdu, 2012). The habitual business person shall now act as an innovation seeker to proactively engage in the start-up of novel smart enterprises; preferably from the inception, through the life of the venture to the end of its life cycle. Additionally to this, the entrepreneur shall repeatedly persist in this mindset to jump-start creativity and inventiveness in their subsisting entrepreneurial endeavour.
In the body of academic literature, two distinctive perceptions on opportunities have come to light and are being discussed. Firstly, a realistic view where opportunities are already naturally occurring but not clearly visible instead, waiting to be discovered by opportunity seeking alert, skilful or opportune entrepreneurs who then take actions to exploit them (Spilling 1996; Tang et al. 2012; Shane 2000; Kirzner 1997) but the second viewpoint instead advocates that opportunities should be viewed in the perspective of entrepreneurs seeking to create their ventures in an environment which primarily depends on entrepreneurial insights and exploits for its establishment (Berglund, 2007). A borrowed definition from Rae (2006) very accurately described entrepreneurship as the inter-related processes of inventing, identifying and taking action on opportunities, which mixes innovation, decision-making, and enacting.

It becomes very clear that economic growth in the present economy dispensation rely so much on how fast smart ideas are discovered or created for entrepreneurial endeavours and yet not much has been discussed in the entrepreneurial literature on how such ideas are discovered or formulated (Løwe et al. 2013; Shane 2000b). It will be proper to state that if there is knowledge base of how entrepreneurs think or what enables the entrepreneur to discern an idea or opportunity; it will be of immense benefit to the future of entrepreneurship as the next generation will have the privilege of immersing themselves into the habits and thought process that has brought us thus far to further advance the entrepreneurial processes (Nicolaou et al., 2009). Entrepreneurship appears to be rather dynamic and not a flat concept as literature portrays. Therefore, there is a need for a clear explanation to dynamic or complex attributes observed in entrepreneurship. This I believe will help in advancing this discipline and offers a proper comprehension of the practice of entrepreneurship.

In the light of this, this study aims to explore how entrepreneurial opportunities are discovered or created by entrepreneurs through complexity simulation; a complex, complicated and chaotic entrepreneurial environment simulated and observed.

1.1 Statement and Significance of Research Problem.

Literature in entrepreneurship explain how to exploit and organise new opportunities without a thorough description of how these new opportunities emerge (Corbett, 2007). To achieve this, this research incorporates a statistical Bayesian probabilistic approach to
design an opportunity seeking system (Løwe et al, 2012), which aim to explain and describe how entrepreneurs deliberately and proactively develop or create new opportunities. Having studied some academic literature and listened to some accomplished entrepreneurs, the researcher has come to believe that, opportunity emergence emanate from deliberate system thinking and design approach commensurate with present situations, conditions, and environments. Therefore, opportunities are intentionally and proactively generated.

Almost all previous studies on entrepreneurship have focused on one element of entrepreneurship or at most a combination of two or more for comparative study. For example (Elmuti et al. 2011; Senik and Verdier 2008; Rae 2006; Shane 2000; Oghenerobaro 2012; Casson 2005). No study so far has tried to predict patterns that suggest the emergence of opportunity within a system of entrepreneurial endeavours (Baron and Ensley, 2006). Hence, this research focuses on how the emergence of opportunities can be perceived and pursued through a careful analysis of simulation results that is very closely modelled to resemble real world scenario using Bayesian belief network probability modelling, where findings of previous empirical studies of entrepreneurship are modelled in the simulation.

This research will be of immense benefit to entrepreneurial study and perhaps engender new thoughts and philosophy on how to properly deliver entrepreneurial training and education.

Organisations, companies, and national economies will invariably find this research of enormous assistance on how to monitor economic trends, train entrepreneurial staff and plan by statistical prediction futures of their venture economies. Know-how was seen to be the key driver of entrepreneurial pursuit and success but the nature of the expression is dynamic and could only be properly understood through a multidisciplinary concept. Therefore, I integrate complexity science; entrepreneurship and simulation to enable me to achieve a reasonable outcome. This new integrated tool (software) now gives us the ability to predict the possible entrepreneurial outcome of an intending entrepreneur with the minimal know-how of their characteristics.

It follows that so much could be gleaned from past experiences or having marginal prior knowledge of a system. Since the analysis in this research work is based on the belief network system as obtained in Bayesian theory, the conditions warranting prediction is simulated for more accuracy and broader coverage of possibilities. While no other
research on entrepreneurship aimed to predict, it becomes crucial to acknowledge that forecasting in this sense is useful in plan formulations, making decisions, estimation of resource requirements in a broader way.

1.1.1 Problem Statement

Entrepreneurial theories over the years have tried to explain entrepreneurship. The neo-classical theory which assumes that the collective decision of market agents makes the market neutral of opportunities as transactions is perfectly co-ordinated. The psychological theories which presume that the fundamental attribute of people (e.g. personality traits) is what empowers an entrepreneur to discern and exploit opportunities and the Austrian theories “which” presupposes that knowledge gained by individual is what gives the person an entrepreneurial capacity for opportunity recognition, creation, and exploitation (Shane 2000b; Baron and Ensley 2006).

This study is centred on the emergence of entrepreneurial opportunity. The Nigerian entrepreneur is subject to this case study, it is more versatile and through careful evaluation of the elementary compositions embedded in the levels of emergence as described by Lichtenstein (2012) and seen in other journals and articles studied, this research aims to elaborately integrate elements of entrepreneurship to search for patterns of opportunity creation through careful simulation of uniquely designed Bayesian belief network model to enable experimentation.

Opportunity per se may not be the primary driver of new entrepreneurial endeavours. Since many entrepreneurs start a business for other reasons other than perceived opportunity gap in the economic environment this creates a theoretical gap which needs to be filled. Exactly what drives an entrepreneurial endeavour? Is it the entrepreneur? Or is it the economic environment?

These processes begin when entrepreneurial alertness (both external and internal) exceeds a threshold level. The heightening and coincidence of personal energy, traits, prior knowledge, and experience as well as social network put an entrepreneur in a high pressured position to act hence, results in new products, new firms, organisational reformations etc. To ACT here is not a one-off thing but, a purposeful drive to accomplish carefully thought and profitable business (Bird et al., 2012). It is then right to
say that opportunity creation cannot be understood or predicted by the behaviours of the potential parents of entrepreneurial factor alone but, as considered in this research rather through the interactions and counteractions result in children which also relate in a collaborative manner to produce something completely new (emergence).

![Figure 1.1: Conceptual Framework Model](image)

Prior knowledge, personality trait, social network, economic environment and technology are all children (resultant) from the behavioural interactions of their parent elements which will be explained in detail in later chapters. The aggregation of these entities produces a large set of templates of dynamic variables which cannot be studied through approximately linear relationships due to the non-linear interactions between variables and inherent interconnections and interdependence between it. A structure begins to emerge within this context; this structure exhibits system characteristics that seem to be adequately explained when investigated by the tools of complex systems. The conclusion is that this complex structure or pattern is an emergent occurrence which sprouts out of both the exchanges within the system and with external influences.

It may be wrong to assert that research in this field has been successful. Variance can be seen in economic and environmental influences depend on the region of the world. Since environment influences people’s personality to some degree, and to a large extent their social network as well, it becomes very crucial to incorporate the role of environment in opportunity recognition. Many studies in this field are centred around silicon valley and
other developed economies where the environmental factors are relatively predictable and accommodating in contrast to developing economies like Nigeria.

A very good entrepreneurial endeavour is one designed such that the internal and external environments bear a resemblance to each other in valuable ways (Ruhe, 2007). For instance, physicists and engineers invent machines that imitate physical environment allowing them to manipulate physical environmental constraints for their particular purposes. For instance, to extract oil from the earth, etc. Similarly, entrepreneurs design their firms not only as systems that adapt to its enterprise environment to make use of profit opportunities, but also shapes part of its environments to directly reflect both their personal ambitions and their firms resource endowment (Sarasvathy, 2004).

In entrepreneurship research, the emergence of opportunity is viewed from two perspectives:

**The Kirznerian view;** which argues that opportunity emerges from the entrepreneur’s alertness which eventually results in discovery (Kirzner, 1997). **The Schumpeterian view;** in contrast suggests that opportunities are created and willed into existence by an entrepreneur (Shane and Venkataraman, 2003). Certainly, there is a shortage of discussion on deliberate and proactive methods of opportunity emergence. This, however, is the key to having a practical and conceptual understanding of the foundations of entrepreneurship (Løwe et al., 2013).

It is noteworthy that the elements that cause (brings about) opportunity emergence is distinct from emergence itself. Like in biology, cells collectively form tissues, tissues aggregate to form organs and organs collectively form systems and a collection of systems form an organism (Charles, 2015). It can be inferred from this that, although cells form tissues, tissues are completely distinct from cells. Hence, I ask a simple question that the literature does not clearly explain: From where or what does opportunity emerge? Seeing that opportunity is abstract and emerges from the physical manifestation of abstract entrepreneurs’ behaviour and that the sum of the behaviour does not equal the emergent status, we could conclude that the phenomenon is complex. To help give insight into how this process occurs or forms, this research employs simulation techniques which aggregate the behavioural variables into a Bayesian probabilistic prediction model to produce a coherent model of emergent nature of evolving entrepreneurial behaviour.
1.2 Research Questions and Assumptions

Although the trend of entrepreneurship affords research enquiry for many dissimilar academic fields, this research is fundamentally concerned with how the literature addresses the following questions, what assumptions were made, and to extract the potential issues with the assumptions.

**Research question 1:** Why, when and how do entrepreneurs recognize opportunities? The literature suggests that an entrepreneur experiences a generative process when developing an idea for a potential business venture. However, this research potential issue with this assumption is that generative processes are emergent.

**Research question 2:** Why, when and what resource do they use to develop their ideas? The literature assumes that entrepreneurs employ a variety of resources (Personality, Prior Knowledge, Social Network, Environment and IT know-how) as they incubate potential opportunities. But again, the researcher’s potential issues in this question are that these incubated resources are intangible and interact to produce uncertain effects.

**Research question 3:** Why, when, how and what cognitive processes do they exhibit while thinking about a business opportunity? Again another assumption as in the literature is that they exhibit cognitive behaviours as they process information that may develop into a potential opportunity. However, the researcher’s issues with this research question are that cognitive behaviours are better explained through its emergence.

**Research question 4:** Why, when and how do opportunities emerge? The assumption in the literature is that entrepreneurs utilize the hybrid of both tacit and explicit knowledge cum experience (expertise) to foresee the emergence of opportunity. But this is not without potential problems as observed by the researcher which implies that the resultant of hybrid of knowledge is an emergent process.

How does entrepreneurship venture emerge? Is it through opportunity creation or discovery, recognition, evaluation, and exploitation? What are the necessary attributes that help a potential entrepreneur discern an entrepreneurial opportunity that can be further developed to result in venture creation? These questions are aimed to be addressed by this research work. While most literature outputs focus on the front end of
the process, (that is, opportunity emergence) this research aim to explore the back end from which the entire process is engendered. By implication, this refers to the intricacies of internetworking and interactions of the subordinate entrepreneurial elements that manifests as the five key elements under evaluation and are easily seen by the public hence the entrepreneurial front-end process.

The knowledge derived from the literature on complexity science, systems thinking, and creative thinking is applied in probabilistic Bayesian belief thinking. It is expected to enrich the understanding of creative and proactive entrepreneurship methods for opportunity emergence.

1.3 Theoretical Basis

Human society can be arguably a very intricate and enthralling structure that can be studied with scientific methods. With its composition of intellectual beings with the autonomy of will and mind, there seem to be inexhaustible ways in which it can organise, reorganize or re-invent itself (Epstein, 1999). Over the world is found a system of closely interlaced networks of personal ties and social relations through which ideas are disseminated, friendships and trust is built, traditions as well as customs are shaped and intelligence is shared. In the nucleus of the network and trickling down through all levels is embedded decision makers who propagate the norms in neither regular nor random system but by a system driven by geographical proximity, collective history, cultural and religious attachments, shared economic interests and much more.

A persistent enquiry in the study of a social network is how it assists a society to process knowledge which allows it to respond and acclimatize to a continuously changing environment and economies. Understanding this adaptive learning process is of immense economic import as it can help a government to plan a remedy for a dwindling economy.

But as promising as this style of academic enquiry is, it breaks with conventional economic suppositions and necessitates a new type of economic modelling, hence the Bayesian model of entrepreneurship here proposed.

The focus is on three theories that have evolved over time.

The first theory is the neo-classical equilibrium theory which assumes that economies are composed of exploring agents whose cooperative decision about prices makes the market neutral of opportunities as transactions are perfectly coordinated (Shane, 2000b). It argues that there is no room for opportunity discovery as all perceivable opportunities have been recognised and utilized since all participants have equal chances for
opportunity recognition.

Secondly, there is the psychological theory which presumes that entrepreneurship is an expression of stable attributes possessed by some people and not others (e.g. personality traits); which empowers an entrepreneur to discern and exploit opportunities (Shane, 2000b). Enduring human characteristics like risk tolerance, creativity, leadership, need for achievements, tolerance for ambiguity etc., are qualities that validate entrepreneurial ability.

Argument: I suggest that discovery of venture opportunity depends on the comparative difference between people in their eagerness and aptitude to search for and recognize possible opportunities (Shane and Venkataraman, 2003). Shane (2000b) also inferred that advanced knowledge processing ability, exploration techniques and scanning behaviour makes some entrepreneurs more capable or keen to realize opportunities.

Finally, the Austrian theory presupposes that economies are composed of entrepreneurs who possess diverse enterprise knowledge. This know-how is what gives a person an entrepreneurial capacity for opportunity recognition, creation and exploitation even if they were not actively searching for the opportunity (Shane, 2000b). Therefore, the difference in information is what make entrepreneurs see alternate values in some specific goods or services hence, everyone cannot recognise all entrepreneurial opportunity. While entrepreneurship can be explained in the view of these theories, it is not the case with the possible emergence of entrepreneurial opportunity. This is because entrepreneurial opportunity results from the interactions of both psychological and Austrian theories. Times have changed, people have and are being influenced, by technology and thus have changed their lifestyle. An entrepreneur may perceive an idea which is not clear at first but in an attempt to deconstruct and implement this idea finds illumination into what the refined idea(s) can solve.

Technological inventions tend to precipitate sets of ideas and opportunities which are readily visible to any entrepreneur who wears a thinking cap and has a reasonable knowledge of the IT world. This, therefore, justifies the inclusion of technology as a composite contributor to discerning opportunity emergence in an entrepreneurial endeavour as captured in the conceptual framework and model of this research. The ability of entrepreneurs to recognise opportunities and exploit them takes root from the knowledge of current trend in IT and other individual traits that could be from experience, education, social network, passion, alertness, economic environment, family
background etc (Hindle and Yencken 2004; Bailetti et al. 2012).

So much academic investigation has been dedicated to building up the theory of business enterprise. Stevenson et al. (1990) advocate that free entrepreneurial exploration can be to a great extent characterized into three important classifications: why do business visionaries act; how do business visionaries act; and what happens when business people act. Furthermore, the signs to date commonly recommend that a more vigorous proposition of business enterprise requires a predominant comprehension of the many-sided quality and flow of the causal components that are perceived as in charge of entrepreneurial behaviour. Without a doubt, the latest interest in the burgeoning processes of cognition models for example; (Lumpkin and Shrader, 2001) hint that academic investigators have started to shift their interest in support of a more networked type of theorizing about entrepreneurial behaviours with intents to start managing this need.

1.4 Research Aim

This research seeks to evaluate and understand through simulation how entrepreneurs gain and loss enterprise knowledge, through interactions within and across economic situations and environments which can precipitate entrepreneurial opportunities and awareness for business or venture creation. By this, the researcher aims to contribute theoretically to the study of entrepreneurship by proposing a new research methodology termed (Simupreneurship) and conceptual framework which views entrepreneurship processes as complex and emergent processes.

In fulfilling the research aim, the researcher shall explain how the five theoretical behavioural variables of entrepreneurship exploited in this research interact with each other to create an entrepreneurial opportunity. This will be done through simulation. This could be because most literature focuses on the emergence of firms rather than the entrepreneurial endeavours that result in the emergence of firms. Others have also viewed the emergence of firms as success in entrepreneurship rather than see firm creation as an instrument that points to a fruitful entrepreneurial endeavour and not necessarily success (Menon, 2002).

1.5 Research Objectives

Here is the list of my research objectives, I shall;
i. Carry out a critical and all-inclusive review of the literature to define the inherent quantitative and behavioural gap in the study of entrepreneurial opportunity, from the particular perspective of enterprise policy.

ii. Develop a conceptual framework consisting of evidence-based entrepreneurial traits and economic variables conducive for entrepreneurial opportunity.

iii. Design or identify and select simulation software capable of dynamic simulation and develop a dynamic simulation model.

iv. Run the entrepreneurial opportunity seeking simulation scenarios under investigation, which includes varying the locations of lone information centers, evaluation of multiple information centers and investigation of distributed information centers, to measure the effect on entrepreneurial opportunity emergence and exploitation.

v. Evaluate static and dynamic perspectives of entrepreneurs' behaviours and opportunity seeking, as they interact with available sources of enterprise information and inspiration.

vi. Interpret the simulation results through the survey data in the context of actual Nigerian entrepreneurial policies and activities of Nigerian entrepreneurs, and make policy recommendations to improve Nigerian entrepreneurial policy-making and document all the procedure in a document called dissertation.

These objectives were achieved through a critical literature review and simulation to create a conceptual model proportionate and adequate to suit the Nigerian economic environment; from which data samples shall be drawn to determine how entrepreneurs discover opportunities within their environment and how these factors motivate them to act and explore the opportunities so perceived.

1.6 Contributions

Shane and Venkataraman (2000) assert that the enterprise phenomenon called entrepreneurship requires a broad theoretical structure or framework which they found lacking in the field of academic enquiries. They surmise that for an intellectual faculty to
be valuable, it ought to have a structure or an academic spine that can explicate and 
foretell a set of practical phenomena that has not been explicated or forecasted by 
existing knowledge already in exploration in other fields of study. Because previous 
academic enquiries aimed at examining specifically how entrepreneurial thinking might 
be unique is lacking (Dunning et al., 2003), a new theoretical direction is projected in this 
research to signify an essential input to this field of study. More distinctively, the creation 
of theoretical opinions that explains the disparity in self-knowledge and the 
predisposition to procedure and the integration of new knowledge to broaden preceding 
academic works in a manner that effectively reveals the intricacy of the decision 
processes behind an entrepreneurial engagement (Casson, 2005).

- Therefore, this research contributes to knowledge through enhancing the study of 
entrepreneurship by looking at entrepreneurial opportunity emergence as a 
complex emergent system (CES). This will demonstrate through simulation how 
‘entrepreneurs think’, how small behavioural tendencies leads to a bigger change 
in a system and adopting a system view to adequately explain how entrepreneurs 
respond to search for opportunity. In an attempt to achieve that, this study will 
fulfil a significant purpose by providing a groundwork for further academic 
research to persist in broadening entrepreneurship through insight into a further 
revealing and parsimonious supposition of entrepreneurship.

- Creation of a theoretical simulation framework for investigating entrepreneurship.

- Appying simulation to entrepreneurial study which is a deviation from the norm.

The values of these additions to knowledge can be abridged as follows. What seemed to 
be like a succession of debatable connections may perhaps be entrenched with some 
foreseeable associations (Casson, 2005). By making use of the inter-multidisciplinary 
(Entrepreneurship, Simulation, Complexity Science, i.e. systems thinking and network 
analysis) perception of intellectualism and Austrian economic postulate to evaluate the 
basis of other kinds of rational factors, this study aim to demonstrate some measure of 
orderliness that evocatively differentiates a model of thoughts that could be regarded as 
entrepreneurial in that it showcases a propensity to classify economically related 
circumstances as opportunities.
1.7 Personal Motivation and fears

1.7.1 Personal Entrepreneurial Experience

The researcher himself became a small-scale entrepreneur, his own experience contributed to this work. He registered a small service company that manages office complexes and saddled with the responsibility of maintaining and cleaning of the buildings. With a crop of ten employees, his experience was centred on the following few attributes.

1.7.2 Innovation

It is common among many authors to consider innovation as more important than other characteristics and have therefore offered the definition of entrepreneurship as the act or process of “initiating new products, executing production technique, devising new sources of raw materials, and discerning new markets” (Spring and McDade 1998, p.3). The consistent repetition of new in the definition is remarkable and must be taken into notice in an attempt at understanding what innovation means.

Innovation, therefore, can be perceived as a process of transforming an initiative or invention into goods or services that generate value which has a commercial demand by customers. To be viewed as an innovation, an idea ought to be reproducible at a sparing cost and should fulfil a definite requirement. Innovation comprises of planned exploitation of information, ingenious capability and activity in inferring further significant or varied qualities from resources, and integrates all processes by which fresh thoughts are produced and transformed into very useful commodities. In business, innovation regularly manifest when commercial ideas are interlinked and put to use by the organizations or associations keeping cognizance of the final aim which is, to satisfy the requirements of the customers. In a communal situation, advancement creates fresh strategies for affiliation creation, joint venturing, adaptable hours of work, and manufacturing of procurer’s acquiring power.

We should know that innovation may not always be the introduction of brand new things or idea, but in the view of Schumpeter, it may just be a reconfiguration of something already existing. In accordance with (Schumpeter, 1995), free enterprise is a progression of transformation where novelty is the most important task of the business visionary. In commenting on entrepreneurship, (Chileshe and Zambia, 1992, p.96) puts forth that an entrepreneur “is a person with definite exceptional quality capable of organizing and overseeing commercial undertaking that entails risks”. Innovation basically means
change and could be holistic or partial which could be an alteration in the hitherto state of product or services, but while it means change, Schumpeter emphasises change through the presentation of new innovative procedures or commodities. It "includes discovering new and better methods for doing things that are marketed whilst investigative innovation involves the formation of another product or idea just about for its own particular purpose or to fill a need other than business" (Rwigema and Venter 2005, p.113).

1.7.3 Courage to start

Uncertainty in an entrepreneurial act is an important factor (Cantillon, 1932). (Duru 2011, cites Kirzner 1997) who conceives of an entrepreneur as any individual that is vigilant to lucrative opportunities for exchange and functions on, and makes use of opportunities that spring forth from new technology. Also, in the view of (Knight, 1921) an entrepreneur could be seen as a calculated risk taker who takes risks, with reward (that is profit) being the payment for the risks taken. (Mbhele, 2012) citing (Zimmerer and Scarborough, 2005) avers that business people are new organizations proprietors or blends that emerge even with risks, unforeseen circumstances, and instability with the end goal of accomplishing benefits and development.

1.7.4 Fear of failure

Fear is an enemy of any venture that is yet to start,

The impact of uncertainty and fear on entrepreneurial emergence or evolution is one that has defied simple explanation. It can be better stated that there has not been any dedicated literature to explore the effect of fear in entrepreneurial start-ups. It is no doubt that, the fears displayed by entrepreneurs vary based on the level of confidence in the venture so created or the support enjoyed by associates or colleagues who are in some ways part the emergence story of the venture or business.

The palpable fear in the process of entrepreneurial pursuit and in the face of hitherto not known uncertainty very much tend to alter or tilt entrepreneurial choices or decisions. The eventual resultant choices which before could not have been noticed leads to an emerging trend for an active entrepreneurial reality.

- Losing my investment
- Business collapse
1.7.5 Lack of absolute confidence although it is right to say that confidence grows proportionately with success, confidence is a vital tool in the armoury of an entrepreneur.

Peter T. McIntyre (n.d.) once said that;

*Confidence comes not from always being right but from not fearing to be wrong.*

Confidence is for the most part communicated as a condition of being sure either that a speculation or forecast is right or that a favoured strategy is the best or most appropriate.

1.8 Thesis Overview

Chapter 2, Chapter 3 and Chapter 4 of this research highlight a critical, constructive and broad literature review of the main topic of discussion in this research. An overview of entrepreneurship was conducted with a subjective and objective study of the theories that has dominated the development and continuous study of entrepreneurship in business, social sciences, and technological innovative perspectives. The concepts of opportunity recognition process, Austrian economic theory, opportunity as emerging complex system, alertness as the foundation for opportunity recognition and the cognition process was elaborately discussed.

Chapter 5 provides an overview of the development of a conceptual framework for this research from which, a suitable conceptual model was adopted and hypothesized to properly correlate the variables being evaluated for causation and effectuation within the system simulation. The simulation is built on the Bayesian probability system which adequately evaluates the patterning and possible prediction of occurrences that possibly inferred by the interactions of the variables within the context of this research. Finally, a dynamic simulator style animation was inculcated to demonstrate an observable phenomenon that better bring home the idea of entrepreneurial emergence.

Chapter 6 objectively explains the research methodology techniques used and its justification. Chapter 7 however discusses the data collection and analysis method, a philosophy in which, simulation sourced data and primary sourced data were combined to do a comparative explanation of the data.

Chapter 8 provides a thematic discussion of the findings for this research together with the procedures utilised in the technical analysis of the variables for the eventual data
generated from the simulation. This means a critical discussion of the results, summary, analysis and the interpretation of findings. The effects of the variables; Technology, Environment, Personality traits, Social network and Prior knowledge are deeply discussed in the context of this research and entrepreneurial endeavours at large.

Chapter 9 entails a brief research conclusion of the findings of the research and suggestions for further research. It also highlights the success and the perceived impact of this study.
Chapter 2: Customary Entrepreneurship

2 Entrepreneurship

John D. Rockefeller (1839-1937) once said that, the development of an extensive business is simply a survival of the fittest.

2.1 Introduction

The rationale behind this chapter is to evaluate the existing literature on the entrepreneurial opportunity as a process of discovery (Kirzner, 1997) and creation, (Shane and Venkataraman, 2003). Through this critical review, the chapter looks at another dimension of this process as emergence; which it proposed adequately explains entrepreneurial opportunity as evolving, whether perceived as created or discovered.

2.2 Traditional Entrepreneurship

The ample studies on business enterprise can be separated in three principle classes: what happens when business visionaries act: why they act, and how they act? In the first case, the researcher is worried about the after-effects of the activities of the business person, not the business person or even his or her activities as such. It is by and large the perspective taken by market analysts, for instance (Schumpeter, 1934), (Kirzner, 1997) and (Casson, 2005).

The second current might be termed the 'mental or sociological methodology', established by (McClelland, 1965) and (Collins and Moore, 1964) in the mid-1960s. Their work gives a helpful accentuation on the business person as an individual and on the thought, those individuals with their experience, surroundings, objectives, qualities, and inspirations are the genuine objects of examination. The reasons for individual entrepreneurial activity constitute the essential enthusiasm of the analyst (Bird et al., 2012). Both the individual business visionary and the economic environment as it identifies with the intentions of individual entrepreneurial conduct are considered. It is the why of the entrepreneur's activities that turn into the focal point of consideration (Elmuti et al., 2011).
How entrepreneurs act is the third theme in the literature. For this situation, academic scholars scrutinize the qualities of entrepreneurial administration, about how business people can accomplish their objectives, independent of the individual motivations to seek after those aims while holding steady the natural actions and impacts of such activities. This research proffers an alternative perspective which sets out when, why and how entrepreneurs act and simultaneously examined as interactively involved in the emergence of entrepreneurial output, which in this regard is an opportunity to perceive or create as to solve problems where the proposed solution leads to a satisfactory outcome. This is a quest that has not been properly explored and no viable explanation has been provided thus far in the literature.

**2.3 Discerning Entrepreneurial Environment**

Lowe asserts that the starting point of every entrepreneurial activity lies in the ability to thoroughly understand the macro environment, its variables, and the impending threats and opportunities (Lowe and Marriott, 2006). They derive this from the increasing globalization of communications, the evolution of regional trading blocs (ECOWAS, EU, AU, ASEAN, and NAFTA among others), the constantly changing behaviour of consumers, and the emergence of an anywhere and anytime competition in global markets (Boyer et al., 2004).

Data and knowledge asymmetry and prior learning infer that individuals tend to notice information that is identified with the knowledge that they already have. Along these lines, Shane (2000b) in reference to (Shane, 1999) proposed that business people will find opportunities in light of the fact that former learning triggers acknowledgment of the estimation of the new data (findings). Drawing on the Austrian financial matters contention that enterprise exists due to data asymmetry between various performers, (Shane, 2000b) keeps up that any given business visionary will find just those open doors identified with his or her former information. In his three-stage investigation of opportunity acknowledgment procedures (Shane and Venkataraman 2003; Shane 2000b) tried and affirmed various speculations, which could be outlined as follows:

Any given entrepreneurial open door may not be evident to every potential business visionary; the reason being that all individuals do not have the same knowledge in the meantime (Kirzner, 1997). Every individual's particular former information forms a learning curve which permits them to perceive certain opportunities, yet not others
(Hayek 1945; Ronstadt 1988). Three noteworthy measurements of former information are critical to the procedure of entrepreneurial disclosure: earlier learning of business sectors, earlier information of approaches to serve markets, and earlier knowledge about client needs.

In her subjective study utilizing theoretical mapping of entrepreneurial opportunity recognizing procedure, Sigrist hypothesizes that there are two sorts of earlier learning important to this recognition process (Sigrist, 1999).

1. Driven by this uncommon passion, a business visionary (entrepreneur) invests much exertion and energy to participate in self-teaching and discovery that advances and develops their abilities, in this manner increasing significant information about the subject of interest.

2. The second kind of learning alludes to an alternate area, and information about this space is gathered throughout the years while working in a specific employment. This occupation is, much of the time, not connected with the principal area of fun and interest. It is, somewhat, an after-effect of a normal decision, frequently made on the guidance of other individuals (folks, coaches, and companions). Following various years of involvement in an industry connected with this second postulate, the business people unite the two capacities. The joining of the two areas prompts the disclosure of another opportunity, another business sector, or another answer for client's needs.

2.4 Perspectives in Entrepreneurship

This study was proposed to examine entrepreneurs’ experiences as they perceived potential good fortune-opening, and to investigate and comprehend their impression of the subjective processes included in those encounters. The extra research was expected to illuminate the discernment experienced amid circumstance acknowledgment retaining the view that, the final objective is to add to the improvement of a hypothetical subjective system of the practice. The entrepreneurship literature specifically focusing on opportunity recognition first appeared in 1984, when (Long and McMullan, 1984) proposed that opportunity recognition is a practice that is under the personal control of the entrepreneur. Later researchers tried to understand opportunity recognition in relation
to intuition, alertness, intentionality, insight, personality traits, self-efficacy etc (Tang et al. 2012; Elmuti et al. 2011; Lynn 1969; Pihkala 2013; Fayolle and Gailly 2015; Klyver and Schøtt 2011).

There is also research in the opportunity recognition literature for examining entrepreneurial cognition. One study by (Baron and Ensley, 2006), compared skilled and novice entrepreneurs to determine if their cognitive frameworks regarding opportunity recognition differed. Their results indicated that sophisticated business people consider opportunities in more complex and practical approach from an enterprise plan of action perspective than do tenderfoot business visionaries. They then recommended that these subjective structures could be identified with example acknowledgment since business people might secure psychological systems that help them in coming to an obvious conclusion regarding apparently inconsequential changes or occasions and in identifying the significant order in these connections (Baron and Ensley, 2006).

Although attempts have been made to identify opportunity recognition as an important precursor relative to new venture initiation, an accepted theoretical model of opportunity recognition remains lacking. Baron and Ensley (2006) noted that the above-mentioned factors have been studied separately and cited the need for the development of a framework integrating the concepts in order to understand the basic nature of enterprise prospect identification.

There also exists scholarly gap in the body of academic writings pertaining to the cognitive procedures intrinsic when entrepreneurs stumble upon the opportunity and recognise it. Entrepreneurship researchers have only recently begun investigating how entrepreneurs think (Laura 2012; Nixdorff 2008; Corbett 2007). Their terminology for this cognitive process, “entrepreneurial cognition,” has evolved with the following explanation: entrepreneurial perception is about seeing how business people use streamlining mental models to sort out beforehand detached data that helps them to distinguish and develop new merchandise or services (Mot, 2010) and to gather the important assets to begin and develop organizations because, individuals procure their inclinations through an assortment of learning encounters, convictions about themselves and the way of their reality rising through immediate and aberrant training encounters. They make a move on the premise of their convictions utilizing learned abilities implied (Mitchell et al., 1999).
Dunning, however, proposed that one should be startled by the absence of a closer concentration on the part of human comprehension in the quest for an opportunity in other words good fortune (Dunning et al., 2003). It should be noted that the terms, cognitive process, cognition, emergence, opportunity emergence and entrepreneurial cognition are used interchangeably throughout the literature. This could be confusing and often times misconceived. Therefore, the researcher regards it as opportunity emergence in this research.

In the present push to broaden existing business enterprise hypothesis, this thesis receives two essential hypothetical points of view. The first is that of Austrian financial matters. Rather than the neoclassic monetary point of view which contends that target financial frameworks yield choices made exclusively on price (Shane, 2000b), the Austrian viewpoint underlines a subjective hypothesis of quality where monetary business sector members make a move in light of indeterminate information (Menger, 1950). For instance, the customary neoclassic point of view neglects to represent a considerable group of examination recommending that monetary business sector data is not generally objective (Weick, 1979) or similarly accessible to all people, and is in this way exorbitant to advance (Hayek, 1945). Also, it neglects to recognize that people normally do not posses indistinguishable inclinations, or usefulness capacities (Jensen, 1994).

By concentrating on uncertainty, instability of data, and activities in view of the subjective judgments of self-intrigued monetary on-screen characters, the Austrian point of view gives a system to fuse already disregarded bits of knowledge got from the sociologies into a more powerful hypothesis of business contends (Casson, 2005).

The second hypothetical viewpoint received within this exposition is that of personality perception (Forbes 1999; Mitchell et al. 2002a). A psychological viewpoint expects that people are dynamic data processors says (Mitchell et al., 2002a) whose essential behavioural part as business people is settling on riches generation choices in light of future desires that require judgment (Casson, 2003). By underscoring subjective procedures as a typical fundamental instrument crosswise over people, the psychological point of view upgrades our capacity to consolidate multidisciplinary bits of knowledge. Thus, a psychological point of view gives the chance to disclose all the more thoroughly and to foresee both why and how business people are liable to carry on in light of various data (information and knowledge) and inclinations (Mathew et al., 2006).

This point of view gives all around created ideas and procedures for breaking down the
particularly human attitudes of entrepreneurial choice making (Dunning et al. 2003; Mitchell et al. 2002b). The aggregate bits of knowledge of the Austrian and psychological points of view permit this exploration to create a full comprehension of the entrepreneurial style of reasoning so as to think for a many-dimensional and integrative assessment of the different subjective investment assets that are at hand in fledgling enterprising activities (Dimov, 2010). This appraisal will encourage a more exhaustive hypothesis of business enterprise by showing correctly how distinctive sorts of personality and collective data sources join with many other intellectual inclinations which give rise to enterprising activity (Shaver et al. 1991; Martindale et al. 1996). While exploring a completely dynamic intellectual model is beyond the extent of this exploration, this examination looks to develop and clarify existing hypothesis of the intricate and multidimensional nature of the psychological assets business visionaries have and applies to the opportunity identification process (Mike and Susan, 2011). In doing as such, this exploration will serve a vital capacity by giving an establishment to future examination to keep reaching out into a more exhaustive and closedfisted hypothesis of business enterprises.

To discover or identify qualities which could clarify new businesses procedures, scholars on enterprise study has for quite a while now been engaged in series of knowledge pursuit (studies). This study concentrates on the procedure of the development of chances which accelerate new businesses formation as concurred by (Dean et al., 2011), where individuals' self-originations, goals and the consequent need to discover career option or profession choices have the most focal impact on the start-up choice (Lynn, 1969).

That is to say, specialists do not consider the variety in entrepreneurial parts and sorts when attempting to comprehend and discover linkages between individual qualities and entrepreneurial conduct (Charles, 1995). Therefore, rather than scanning for one determinant, we ought to rather hunt down the sorts of those imperative enterprise activities. While scanning for these characters take note that, the method of the appearance of entrepreneurial on-screen character differs to an extraordinary degree in the opinion of (Maria, 2005). That is a reality that is exceptionally unequivocal in business enterprise writing. Be that as it may, in examination concentrating on the determinants of entrepreneurial conduct the qualification between various types of entrepreneurial conduct' appears disregarded.
The next section is an analysis of such extant theories in the context of Nigerian entrepreneurship research.

2.5 Entrepreneurship in Nigeria

Entrepreneurship in Nigeria began with individuals’ production of excess goods and services which led to trades by the barter system and of course rising needs and demand. This system evolved over time into specialization, as people came to the cognizance of the fact that they could focus on producing more of particular goods and services, and exchange them for those they do not have or produce says (Afolabi, 2015). Not only did the production of excess goods and services by individuals as well as an increase in needs and demand create entrepreneurship, entrepreneurship in Nigeria stepped up to another level with the presence of colonial masters who in interacting with the locals trained and made of Nigerians, middlemen in governance as well as in trade. The change from dependence on agriculture for consumption and trade to over-dependence on crude oil also in its own way is another huge factor that reshaped entrepreneurship in Nigeria.

Conceivably it is the state of Nigeria as a less developed country, her history, her human and material endowments, or the transitions of the Nigerian economy over time that has bequeathed Nigeria with an increasing upsurge of entrepreneurs. According to (Ihugba et al., 2013), Nigeria as a nation has various business and venture possibilities because of the rich, lively and dynamic human and natural assets it has. They include that: Business exercises and inventive innovations in Nigeria have created ventures in ranges, for example, farming/agro-unified commercial enterprises, solid minerals, transportation, data and telecom, hospitality and tourism business, building and development and so on. To add to the above, Afolabi (2015) states that the Global Entrepreneurship Monitor (GEM) meeting of 2012 has observationally distinguished Nigeria as a standout amongst the most entrepreneurial nations on the planet. It was revealed by the same study as noted by Afolabi, that thirty-five out of every one hundred Nigerians (over a third) are involved in some sort of entrepreneurial engagement or the other, hence it is common to find in Nigeria people of every tribe, age, class/status, religion and sex involved in entrepreneurship, some to just survive daily, while others do in order to add to their wealth.

Perhaps it is fitting to say that it is these same things – the state of Nigeria as a less developed country, her history, her human and material endowments, or the transitions of the Nigerian economy over time that have engendered various challenges that militate against entrepreneurship in Nigeria, and has given a uniqueness to the Nigerian
entrepreneurship, shaping its entrepreneurial climate. This is in accordance with (Spring and McDade, 1998) who rightfully declare that any useful entrepreneurial action must be referenced inside of its general financial environment on the grounds that in the perspective of (Kennedy, 1980), business action does not happen in a vacuum but rather is set inside of a financial framework. Again in the perspective of (Spring and McDade, 1998), the circumstances that support business enterprise might shift impressively starting with one society then onto the next. Its type of expression contrasts as indicated by authentic phases of the general public’s (societal) improvement and whether the financial framework is a pre-capitalist, early or late industrialist, communist or other. This then means that entrepreneurship in Nigeria, within her environment is distinctive regardless of the challenges militating against it, which includes absence of learning in the essential sciences and innovation, absence of concrete patent law, high cost of trading and transactions in Nigeria, lack of capital/finance, inappropriate incentive structure (Resource course), among others (Duru 2011; Eme 2014). Entrepreneurship still thrives due to the risk factor, producing opportunities, creativity, and innovation in the Nigerian environment. In fact, in agreement with (Afolabi, 2015), Nigeria's GDP increase rate of between 6 to 8 percent in the most recent ten years demonstrates that Nigeria is one of the quickest developing economies in the world. The conclusion drawn from this is as confirmed by (Afolabi, 2015), any profitable business set up is fit for creating uncommon or more normal returns. It is one of only a handful couple of nations with the most astounding degrees of profitability anywhere around the globe, market, capital business sector, shared assets, land and property, enterprise, and so on.

Although most of the studies and writings on entrepreneurship available in the literature have their roots in Europe, not all concepts and theories can be said to be applicable universally. They present the following as some of the reasons why entrepreneurship in West Africa seems to differ from what obtains in other countries, particularly the industrialized/developed nations.

Entrepreneurs in Africa go into business with very little capital/resources, although regardless of the dearth of sufficient resources, some succeed. In agreement with (Diomande, 1990), they argue that while African entrepreneurs lack the liberty of selecting those who work for them from a large pool of skilled labour force, which seems to be lacking in developing nations, they gather and train workers via apprenticeships, tutelage, arrangements, family members, and acquaintances. While their counterparts in developed nations can afford to “over source and wastefully use resources that are not needed” (Diomande, 1990, p.191) referred to in (Spring and McDade, 1998, p.7). To
raise capital to start and run their businesses, entrepreneurs in developing, West African countries depend on community resources like rotating credit systems involving social groups.

They add that African entrepreneurs diversify their investments hinging on the belief that having numerous types of businesses at the same time prevents uncertainties which are frequent in the economic climate of many African countries, even though Western observers root against operating several businesses at the same time because it signifies a lack of commitment.

Again (Spring and McDade, 1998) and (Diomande, 1990) note that while entrepreneurs in industrialized countries focus on high technology industries and the introduction of high-tech products, entrepreneurs in less industrialized/developing countries focus on trade, real estate, transportation and agriculture. The big questions (Diomande, 1990) and (Spring and McDade, 1998) raised in their study are first, why are there very few large African manufacturing firms despite a large number of craftsmen available? Secondly, why does there seem to be very few large trading African firms despite the fact that trading is a widespread occupation in Africa? The answer is the paucity of capital for investment as a huge hindrance to the growth of small firms into large corporations.

Therefore, in addition to other factors previously mentioned, scarcity of capital/resources in West Africa, Nigeria to be specific is a big factor which defines and shapes entrepreneurship in Nigeria as distinct from those of other parts of the world. Nevertheless, no matter in which part of the world entrepreneurship is studied, two main functions run through all entrepreneurs to organize or manage resources as well as to boost economic output.

Thus, entrepreneurship is a complex process emerging from complicated or chaotic systems, but through elementary behaviours that aggregate to create the opportunity which transforms to entrepreneurial adventure, when pursued through deliberate and calculated actions. The interest in this study is focused on Nigeria as the empirical case. Can we learn anything from Nigerian entrepreneurs and entrepreneurship? Is there a significant pattern in the way opportunity emerges amidst Nigerian entrepreneurs? Is it possible to predict the outcome of an entrepreneurial tendency amongst individuals or groups seeking to embark on an enterprise? The literature study revealed certain variables which were found to be recurrent amongst scholars and is dominant in the entrepreneurship articles seen. They include; personality trait, social network, environment, prior knowledge and the technology know-how. Using these attributes this project aims to find out if there are any concurrent patterns in the entrepreneurial ventures emergence using a West African nation called Nigeria as a case study.
2.6 Challenges Facing the Nigerian Entrepreneur

Several authors including (Duru 2011; Baba 2013; Ihugba et. al. 2013) present the following as the challenges facing entrepreneurship in Nigeria. They include:

2.6.1 Poor or lack of knowledge in science and technology

It is difficult to imagine the state of an economy without science and technology. This is because science and technical innovations are the essential quality underpinning the economic development, growth and social transformation of economies. This section aims to explain the economic contributions of the conceptual framework variable, technology know-how and why it was necessary to be among the main variable.

Hornby (2000), states that science is the investigation of information which can be made in a framework and which as a rule relies on upon seeing and testing realities and expressing general characteristic laws. In (Akase et al., 2015), (Uza, 2014) was quoted where he defines science as cumulative verifiable and communicative knowledge. In their views, pure science is the investigation of nature to satisfy the need to know, while applied science is the application of pure science to solve practical human needs. Aniodoh (2002) proposes that science is the orderly investigation of man and his surroundings in view of the conclusions and deductions which can be made, and the general laws which can be planned from reproducible perception and estimations of occasions inside of the universe.

Okeke (2007) as cited in (Akase et al.,2015) defines technology as a disciplined process of devising and utilizing techniques to convert resources to material objects. And (Uza, 2014) defined technology as a body of knowledge and devices by which man masters his environment. It is a methodical investigation of the strategies and procedures utilized in industry, exploration, farming and trade to improve the life of man in his environment. Technology is not synonymous with applied science, which is more empirical in its approach to solving problems (Akase et al., 2015). The definitions suggest that economies with strong science and technology base prosper more than those that lack it.

In Onipede’s (2010) view, Technology growth is by and large viewed as an impetus for national advancement, since it offers in addition to other things, the vital backing for a change in all the significant divisions of the economy, most particularly in rural and mechanical segments. It is unarguably the prime wellspring of progress that is, of advancements and adjustments required for enhancing generational strategies expected to
push growth and improvement. As is cited in (Onipede, 2010), science and innovation serve as power instruments of progress which can help with the financial, societal, and cultural advancement of individuals' such that the prevalence of the rich countries in terms of their living standards, better health services, and educational facilities is generally attributed to the breathtaking advances in science and technology which has taken place in the industrialized countries during the last two hundred years.

Nwachukwu (2013) offers the definition of science and technological Infrastructure as the mediator inputs that give the premise to the working of different innovations or give crucial services to different divisions of the economy. He clarifies further that innovative framework is comprised of science, building and specialized information accessible to industry. In his perspective, the innovative foundation makes note of universal advancements, specialized data, and research and evaluation facilities, and in addition less unequivocal areas incorporate information significant for vital planning and market improvement. He legitimately advocates that Science and Technology backbone amongst others are a portion of the basic necessities that sustains the innovative and industrial growth of any economy. Nwachukwu argues that the first port of call in discussing the reasons for the lack or poor knowledge of science and technology in Nigeria is education. The reasons for the dearth of (sufficient) knowledge in science and technological expertise can be connected to nothing but the poor state of teaching and education of science and technology in Nigerian schools. In his view, socio-economic development cannot be achieved in Nigeria or in any country at all without science and technology education.

As put forward by Akase, Science education is the instruction or training by which people learn to develop their critical thinking. Science education fulfils this function through basic and integrated process skills. By their presentation of the concept science education, they do not just mean instruction or training in only Science Education Department but also in those other branches of learning such as natural, physical, social and applied sciences, including every other aspect of human endeavour. Interestingly, science technology education in Nigeria is fought against by lots of factors which in the long run as we have seen so far, fights and hinders entrepreneurship in Nigeria. He rightfully states that “The state of available science and basic technology amenities in instructive education foundations is a determinant component of the capacity of the instructive framework to deliver the essential human capital important for accomplishing aggressive economy and social change. As imperative and satisfactory as skilled labour
is, its production, (Nwachukwu, 2013) observed it as a constraint to the growth of science and technology backbone in education institutions in Nigeria:

(i) the absence of skilled laboratory experts
(ii) insufficient laboratory hardware
(iii) poor or absence of brilliant reagents
(iv) poor power supply
(v) poor financing

It is stated categorically, that entrepreneurship has not thrived in Nigeria as expected especially when the (natural and human, in terms of population) resources Nigeria has been blessed is put into recognition. I say this in agreement with (Baba, 2013) who avers that the task of venture in economic improvement includes more than merely expanding per capital yield and wage; it includes starting and developing a change in the structure of commerce and society. This change is joined by growth and extended gains which permit more riches to be dispersed to the different participants. He went further to expresses that: One assumption of monetary growth delineates innovation as the key, not just in creating new commodities or services for the commercial division only but also in strengthening speculative interest for the new quests being made. Once more he includes that: the essential point in the product improvement process is the intersection purpose of learning and an apparent social need, which begins the product change stage. As he would like to think; this point, called instinctive union often ignores to advance into smart development and is an aspect the business visionaries should be encouraged to focus their endeavours. He insistently proclaims that the absence of mastery around there harmonizing the invention with the appropriate market and creation of the requisite conformity is the key assessment of commercial venture improvement in Nigeria; it is hence lamentable that instructions and training (education) are yet to be given the needed attention it merits in Nigeria.

2.6.2 Lack of strong patent law

In the views of (Duru, 2011) and (Baba, 2013), local or small scale entrepreneurs are not protected in Nigeria because of the lack of a strong patent law. With reference to the additions to The New Palgrave: A Dictionary of Economics (2007), a patent is the legitimate right of a designer to avoid others from making or utilizing a specific creation. This privilege is infrequently termed an 'intellectual property right' and is seen as a consolation for innovation while a Patent is the legitimate right of a designer to bar others
from making or utilizing a specific creation. It states additionally that this privilege is usually constrained in time, to about twenty years from the date of the application accommodation in many nations. The rule behind the cutting edge patent is that an innovator is permitted a constrained measure of time to bar others from supplying or utilizing a creation as a part of a request to support imaginative action by avoiding quick impersonation. Furthermore, consequently, the designer is required to make the portrayal and usage of the creation open as opposed to keeping it a mystery, permitting others to construct all the more effectively on the learning contained in his innovation. It is a type of protection that furnishes a person or legal entity with limited rights to produce, use or sell a concept or invention at the same time keeping out others from doing the same within the duration of the patent. Despite the protection provided by patent laws in countries, (Duru, 2011) puts forward that home based entrepreneurs in Nigeria not only face serious competition with foreign producers/manufacturers, they also have little or no faith in the Nigerian patent Act due to the fact that they have believed that it provides them little or no protection against piracy, therefore does not protect them.

2.6.3 High cost of doing business in Nigeria – lack of capital/finance

Doing business in Nigeria is characterized by a high cost of equipment and insufficient working capital. Onuoha (2013) is of the view that the main reason behind this high cost is high costs of a working capital emerges from the deterioration of the Nigerian naira against other monetary forms on the globe consolidated with high credit rates and amazing troubles in getting to loans for working capital, especially by little and medium scale businesses. Duru (2011) rather has a different view. He argues that the main reason why people go into businesses or make investments is to make a profit. But when what is put in is much more than what is got from what is put in, who then keeps up? Who then continues?

In Duru’s view, when returns from an investment are more than the opportunity cost, that, becomes a disincentive for the entrepreneur. In his opinion, which differs from that of (Onuoha, 2013), one of the main reasons why the cost of undertaking business in Nigeria seems to be pretty high is as a result of a collapse of infrastructural facilities as well as unrestrained corruption in the country, which has made entrepreneurs to expend large sums of money in their businesses just to make available essential infrastructure like electricity for example, and also grease the palms of government officials just to make things easy for them and make their businesses survive. All these he concludes makes running a business in Nigeria expensive causing unfavourable results for profitability. Ilhuegbe et al. (2013) present another reason why there is a high cost of undertaking
business in Nigeria. In their view, elevated cost of engaging in business in Nigeria is an upshot of political and economic instability in the country.

### 2.6.4 Inappropriate incentive structure

Duru (2013) yet again observed that one of the challenges of entrepreneurship in Nigeria is inappropriate incentive structure. As an explanation to this, he presents reasons as to why the average Nigerian lacks motivation or encouragement to become an entrepreneur in Nigeria.

Firstly he mentions the oil boom. That is resource curse as a result of the oil boom in Nigeria. Resource curse basically refers to decline as a result of dependence or over-dependence on oil. (Odularu, 2007, p.2) in his work, claims that economists consider “resource curse to mean the concurrence of unlimited mineral resources and compelling individual neediness (poverty) in developing nations like Nigeria”. Though (Gary and Karl, 2003, p.21) characterizes "resource curse" as the Negative improvement results connected with petroleum and different minerals. Basically, this alludes to the opposite relationship in the middle of development and common natural resources abundance, particularly minerals and oil. They express that in accordance with discoveries affirmed by financial analysts in the World Bank and International Monetary Fund (IMF), Nations that have not naturally occurring minerals (without petroleum) grew four times more quickly than minerals rich (with petroleum) nations somewhere around 1970 and 1993—regardless of the way that they had a large portion of the reserve funds. The more noteworthy the reliance on oil and mineral assets, the more regrettable is the development execution.

Duru (2011) reiterates that the oil boom seen especially in developing economies has damaged and negatively changed our approach to occupation, and this has affected the mindset (mentality) of the typical citizenry due to the desire for quick money with a case study of Nigeria. But why is this so?

- Secondly policy instability. And a biased incentive structure that rather than favour long-term transactions with its consequent dividends favours short and shabby transactions that yield quick returns within a short period of time, dampening innovation and consequently entrepreneurship. They go further to mention the following ways over dependence on oil can hurt or hurts development in a country. They include as is stated in their study:
Gary and Karl (2003) Suggests that;

- Oil discovery raises desires and expand hunger for spending. The guarantee of oil riches significantly transcends the government’s organisations and ministries in oil-trading nations. A boom attitude not just influences the way that administrations act, making vainglorious arrangements and thoughts, however, it additionally shapes how individuals react. Hard working attitudes are undermined, and profitability sinks in exchange for quick and easy money which in-turn lower entrepreneurship activities.

- Governments in developing economies like Nigeria tends to significantly increment government expenditure in view of unreasonable income projections. In all OPEC nations, benefits expanded both government spending and the ravenousness for exchanges by an element that was more than proportionate to the span of the boom itself. This implied spending immediately surpassed incomes. Regardless, diverse authorities and groups kept on requesting much bigger shares of national treasurer when petrodollars were rare.

- Booms have been seen to diminish the nature of public expenditure and promote rent-seeking. The grouping of financial assets from an oil boom cultivates intemperate and rash venture. It likewise prompts the mal-dispersion of assets, a decrease in profitability, and huge defilement. Self-important "white elephant" ventures, encumbered by huge corruption in the granting of import allocations, industrial licenses, exchange establishments, minimal premium loans, and access to foreign exchange, turn into the typical mode of everyday operations.

- Petrodollars supplant more steady and reasonable income streams, compounding the issues of economic growth, straightforwardness, and responsibility. This exemplifies Nigeria's bind as oil incomes after some time diminish dependence on non-oil revenues, it could really supplant beforehand existing tax collection frameworks. This liberates oil-exporting governments from the sorts of subject requests for financial transparency and responsibility that emerge when individuals pay taxes specifically to the government thus smothers entrepreneurial endeavours which does not find encouragement.

- Non-oil productive ventures, such as industrial assembling and horticulture, are unfavourably influenced by the oil sector in a manner called the Dutch Disease. The Dutch Disease happens when oil benefits push up the genuine conversion
standard of a nation's legal tender, rendering most business involvements non-
competitive. In the meantime, relentless Dutch Disease invites a fast, even
contorted development of administrations, transportation, and development, while
at the same time debilitating some industrialization and farming. Horticultural
products, labour intensive engagements especially imperative to the poor
specifically are unfavourably influenced by financial elements set off by the
misuse of petroleum.

2.6.5 The deprived state of Nigeria's infrastructure:
Nigeria lacks the basic facilities that are necessary for the proper functioning of society
making the environment unconducive for entrepreneurial activities. In most states and
parts of the country, it is either a working infrastructure is totally absent or critically
deteriorated. By infrastructure, this research means road network, electric power supply,
water supply, efficient communication among others. There is hardly any state in Nigeria
in which all these are available and in constant supply.
The country’s poor road network filled with lots of pot holes according to (Okezie et al.,
2013) makes the transportation of goods from the places of the harvest to the market and
processing factories a herculean task. Also, (Oghojafor et al., 2011) citing (Imhonlele,
2009) add that the poor state of Nigeria’s road network has caused an enormous loss of
man hours making many businesses inept in meeting up with contracts and business
schedules, as well as leading to lose of cargo and human lives through road accidents.
These, no doubt is serious enough to discourage and frustrate entrepreneurs.

A greater barrier to industry than the poor road network is the unpredictable and
inconsistent power supply. Its state is such that although a huge challenge to the
populace; they have become more used to the lack of electric power or the poor supply of
it, than to the availability and consistent supply of it. Only very few businesses can thrive
in an environment that lacks reliable electric power supply. This means that most, if not
all businesses in Nigeria characterized by its erratic power supply are affected negatively,
making many businesses to fold up, as well as discouraging intending entrepreneurs
because of the obvious inability to keep up with individual power generation which is
expensive and adds to the overall increase in the cost of running the business. The
following statistics were presented in (Oghojafor et al., 2011) revealing how much
inconsistent power supply in Nigeria drains from entrepreneurs. The statistics show that
Nigerians spends about N16.408 trillion yearly just to fuel generators. They present a
breakdown which makes known that the telecommunication sector spends about N6.7
trillion yearly on diesel, filling stations N43.88 billion, industrial units N191.085 billion,
banks N11.7 trillion and business-related activities N1.57 trillion. Even the central government made a provision of N2 billion for procurements, gas and safeguarding of generators for government offices in the 2009 budget (Oghojafor et al., 2011).

Significantly, information/communication infrastructure, particularly the access to internet services has its own impact on entrepreneurship in a country like Nigeria in which there is limited or lack of knowledge or uninformed use of information infrastructure.

2.6.6 Multiplication and duplication of tax

In (Adebisi and Gbegi, 2013), they surveyed the consequence of manifold taxations on Small and Medium Scale commercial enterprises in Nigeria focusing on the west African ceramics limited in Ajaokuta, Kogi State. The study revealed that although taxation which is a duty of the citizens of a country is a source of income for government’s expenditure for the provision of basic necessities such as good roads, water supply, and electricity which are paramount for the survival and smooth running of businesses, it is very necessary that the government considers the income of these businesses and the need for their survival. The study revealed that multiple taxations affects SMEs in Nigeria due to the fact that as they found out, all three tiers of government in Nigeria collect taxes from the same SMEs. In addition to the fact that there is no clear cut policy that stops the collection of illegal taxes like community levies, boys or youth levy, and association or union levy. Again they discovered that taxes are not collected based on the connection between the size and the profit of the business, putting into consideration the various factors that can hinder the advancement of the business. The taxation policy makers and collectors fail to acknowledge the clear relationship between size and ability to pay taxes levied. According to (Ihugba et al., 2013), Nigeria's Companies Income Tax Act (CITA) normalized only thirty-nine taxes and levies, nevertheless, more than 500 various levies and taxes which are moot are forced on business owners by state and local government agents. Besides, in situations where the taxes are legitimate, most of them are duplicated. For instance, (Oghojafor et al., 2011) expounds further by citing (Imohonlele, 2009) that manufacturing corporation independently pay an average of 47 varied taxes, levies, fees permits and licenses to the coffers of the state governments through its agencies, ministries, its development and local government areas. In quoting (Alozie-Endu, 2009), they add to explain the point better, that multiplicity of duties and levies are paid at Nigerian ports. While the Nigerian Customs Services (CNS) singlehandedly collects 12 different levies and taxes, including import duty for the
federal government and other agencies. To make matters worse, it is reported that there are fifteen different agencies working at the ports. All these add to and increase the cost of running a business thereby discouraging aspiring entrepreneurs.

2.6.7 Low standard of education

Poor to access to information is the issue of education. Nigeria is plagued with a limited access to education. As made clear by (Akpor-robaro, 2012), the instructive incubation hypothesis sets that instructive development helps entrepreneurial rise through making of mindful advertisements and new introduction and learning. Based on this theory, it then means that entrepreneurship or entrepreneurial activities in any country will grow and possibly be sustained with a provision and access to education by the masses. They (Ihuoga et al., 2013) argues that education is very necessary for entrepreneurship because it not only prepares the entrepreneur, it also furnishes the entrepreneur with the necessary tools skills and qualities required, as well as keeping him strapped with and in agreement with events surrounding him in the world of today.

2.7 Concept of Socio-Cultural Environment

The socio-cultural environments in expansive expressions include both the social structure and the way of life of individuals. It refers essentially to artificial imaginary mechanisms which influence individuals' behaviour, association, discernment, and way of life, and their continued existence and presence. All things considered, the social-cultural environment involves all segments, conditions, and effects which shape the character of an individual and potentially impact his perspective, conduct, decisions and exercises. Such components incorporate convictions, values, dispositions, propensities, types of conduct and ways of life of persons as created from social, religious, instructive and social moulding. These components are found out and are shared by a general public and too transmitted from era to era inside of that society (Oghenerobaro, 2012).

Along these lines, socio-ethnic environment, in connection to the enterprise, can be characterized as comprising of the considerable number of components of the social framework and society of an individual which emphatically or contrarily influence and impact entrepreneurial rise, conduct and execution, and business development when all is said and done. Every single such component which conditions the qualities, thinking and activity of a person as for business enterprise involve the socio-cultural environment of the business enterprise.
2.8 Specification of Variables

Entrepreneurial opportunity emerges from the opportunistic interactions and counteractions of the entrepreneurial factors under study in this research. This is the view and position of this research and the variables were selected from the body of entrepreneurial literature having been found to be dominant and effectually affected the course of entrepreneurial activities.

Predominant points of view on opportunity recognition proof depend on the hypotheses of the Austrian School, especially on the works of Schumpeter and Kirzner. The Schumpeterian view takes after the opportunity discovery philosophy; the Kirznerian view inclines toward the cosmology proposed by the opportunity created perspective (Dutta and Crossan, 2005). This dichotomy is additionally present in later research on the enterprise. According By (Shane, 2000b) opportunities are discovered; (Baron and Ensley, 2006) states that they are noticed; they are established through retrospective imagination (sense-making) as per (Gartner et al., 2003); yet (Sarason et al., 2005) considered it as socially constructed while (Dunning et al., 2003) prefers to refer to opportunities as constructed and intentionally perceived by the entrepreneur. Recent literature speaks about how an entrepreneur will process data distinctively (Mitchell et al., 2000), however, it did not explicate the challenge of how general data handling moderates enterprise opportunity identification, disclosure or opportunity design and creation. This research relates to how information and the active processing of it create opportunity. Writers have continuously expressed entrepreneurial thoughts but in this study, the focus is on the emergence of entrepreneurial opportunity through abundant thoughts that the prevalent literature has provided so far.

Since the inter and intra-actions of certain factors within the purview of this research aggregate to bring about the emergence of opportunity, the technicalities of this relationships will be further explained to bring into focus the concept that creates the emergence and the process that this study has applied/deployed to bring it into being. This means that opportunity emergence as conceptualised in this research is a synergistic outcome of social behaviours and exposures as well as a conscious effort to apply them into critical reasoning and creative imagination which has often times produced desired outcomes.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Some Sources</th>
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<tbody>
<tr>
<td><strong>Prior Knowledge</strong></td>
<td>(Landström et al. 2012; Marvel and Droge 2010; Shane 2000b)</td>
</tr>
<tr>
<td>-Education</td>
<td></td>
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<tr>
<td>-Experience</td>
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<tr>
<td><strong>Personality Trait</strong></td>
<td>(Dvir et al. 2010; Elmuti et al. 2011; Martinez 2001; Lynn 1969;)</td>
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<tr>
<td>-IQ</td>
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<td>-Creativity</td>
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<td>-Persistence</td>
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<td>-Leadership Skills</td>
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<td>-Responsiveness</td>
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<td>-Risk Tolerance</td>
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<td>-Curiosity</td>
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<td>-Passion</td>
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<td><strong>Social Network</strong></td>
<td>(Minniti 2005; Grossberg 1988; Batjargal et al. 2013; Ulhøi 2005;)</td>
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<tr>
<td>-Education</td>
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<td>-Income</td>
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<td>-Family</td>
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<td><strong>Environment</strong></td>
<td>(Montes and Bastos 2013; Garrett and Wall 2005; York and Venkataraman 2010;)</td>
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<td>-Political</td>
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<td>-Development</td>
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<td>-Cultural</td>
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<td>-Economy</td>
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<tr>
<td><strong>Technology</strong></td>
<td>(Bailetti 2012; Bailetti et al. 2013; Isabelle and Drucker 2013; Shane and Venkataraman 2003; Ford et al. 2009; Rae 2006; Phan et al. 2009; Raman 2010; Wang and Swanson 2007; Damanpour and Gopalakrishnan 1998; Siddiqua and Niazi 2013)</td>
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<tr>
<td>-Initiative</td>
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<td>-Innovation</td>
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<td>-Invention</td>
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<td>-Research</td>
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The prior knowledge possessed by an entrepreneur is a fundamental key to creating new opportunities.

2.9.1 Prior knowledge discussed

\[
Pr(PK_{\text{Emergence}}) \text{ is a Bayesian function of } Pr(PriorKnowledge | \text{Education and Experience}) \ldots \ldots \exp 1
\]

The expression above illustrates the probability of prior knowledge given values of education and experience. This is predicted in this research using a Bayesian probability over given values of its sub-elements as described in remaining parts of the section. The section aims to elaborate on the impact of prior information in the pursuit of entrepreneurship and the influences of education and experience on the variable prior knowledge with a focus on the overall impact on the process of opportunity emergence.

Prior knowledge is very necessary for entrepreneurship. According to (Patzelt and Shepherd, 2010), prior knowledge is made up of the normal and collective society of people, as well as prior entrepreneurial knowledge. By prior entrepreneurial knowledge, they mean information about markets, ways to serve markets, and customer problem (Shane 2000b; Patzelt and Shepherd 2010), and by natural environment they mean phenomena of the material world including the earth, biodiversity and the ecosystems (Patzelt and Shepherd, 2010), while they refer to collective habitat as the various communities in which people live. They propose that as the prior knowledge of an individual’s natural and communal environment increases (among other factors), the chances of the individual recognizing opportunities that will lead to sustainable development increases also.

In his publication, (Shane, 2000b), in agreement with (Roberts, 1991) keeps up that earlier knowledge, whether created through work experience, training, or different means, impacts the business visionary's capacity to understand, extrapolate, decipher, and apply new knowledge in manners that people without the former knowhow would not be able to imitate. Shane presents three measurements of earlier information that are crucial for entrepreneurial revelation:
1) Prior understanding of markets like supplier interactions, sales techniques, or capital apparatus requirements that differ across markets (and how they operate).

2) Prior knowledge of ways to serve markets, this may include manufacturing process, the creation of new products, novel methods of distribution of commodities and services, the use of new materials in production processes, generation of alternative sources of supply, or finding alternative ways of organizing (Schumpeter, 1934).

3) Prior knowledge of customers’ problems, including their needs.

Entrepreneurship cannot be separated from opportunity recognition; this is because, as they claim, entrepreneurial opportunities emerge from changes in the business environment, similar to changes in demand and supply (Lumpkin and Lichtenstein, 2005). In such manner, the opportunity is seen as conditions within which new products, services, crude materials, and coordinating strategies could be offered and sold at more noteworthy than their creation cost (Casson, 1982). Along these lines, among other key components, earlier entrepreneurial information of business sectors, the various ways to serve markets, as well as customer issues, all these existing in and connected to the environment of the entrepreneur or nascent entrepreneur’s natural and communal environment and changes in this environment business-wise, create and expose the entrepreneur to entrepreneurial opportunities. They (Patzelt and Shepherd, 2010) add that an environment is sustained by the entrepreneurial opportunities recognized in that environment, and these entrepreneurial opportunities are recognized when individuals in that environment poses a prior information of the problems in the normal and collective environment they find themselves in. They likewise express that distinctions in earlier information might clarify fluctuation in business people's bearing of consideration towards visible features of the regular and shared environment, and accordingly their acknowledgment of economic improvement opportunities. Most business owners take hold of opportunities that are associated with their own former learning for a specific need of their surroundings (Patzelt and Shepherd, 2010). They further explicate that entrepreneurial knowledge in most cases has an impact on the degree to which the preceding information of the normal and collective environment adds to opportunity recognition for a development that preserves the recent status of the ordinary environment required to make sure that coming generations are able to meet their needs (Kogut et al., 1993).

Ardichvili et al. (2003) cited (Sigrist, 1999) who presents two types of prior know-how which are necessary for the practice of the identification of entrepreneurial disposition:
1. Prior Knowledge can be knowledge in an area or domain that an entrepreneur has a special interest in, which can be said to not just interest him or her, but also fascinates and excites. Ardichvili in (Ardichvili et al., 2003) explains that it is this interest and fascination in this area that drives an entrepreneur into spending much and effort taking part in, as they put it, self-teaching discovering that advances and extends her/his abilities by that increasing significant information about this subject of speciality. This is the initial sphere of prior information.

2. The second domain, which is the second type of prior knowledge, refers to the knowledge that has been amassed over a period of time while working in a certain job. They explain that this job is usually not related to the first domain which is characterized as something of fun and excitement to the individual but an upshot of realistic and logical choice, usually made as a result of advice from people like parents, friends, and mentors. They further explain that as times passes, within which experience has been gathered, the experience gathered in domain two, and the passion or fascination belonging to the first domain are merged together leading to an unearthing of a novel entrepreneurial opportunity, a new market, or a working answer to the problems and need of customers.

2.9.2 Entrepreneurial Education

Some contend that business enterprise cannot be taught in light of the fact that the entrepreneurial conduct is established in the character and identity of the business person and achievement is regularly because of chance (Bruno et al., 2007). In any case, there is an across the board view that business can be encouraged and that exposure to an enterprise can have constructive outcomes, regardless of the possibility that students do not get to be self-employed (Montes and Bastos, 2013). Educational policies can advance the improvement of business and enterprise abilities and experience to help potential business people conquer the basic start-up challenge.

Information policy can help and execute business enterprise instruction in the educational systems, advanced education and in professional training (Mueller 2006; Landsström et al. 2012). Business training ought to have the objective of building up the entrepreneurial outlook, and also conveying particular abilities. Educational institutions ought to tend to increase the number of business courses and participating students, where there is confirmation that these courses have been fruitful. It is additionally critical to guarantee
that entrepreneurship tuitions meets excellent standards and stretches out over an expansive scope of subjects to achieve an extensive variety of potential business visionaries. Educators ought to be prepared and upheld in utilizing intuitive strategies that underline learning by doing (Rae 2006; Marvel and Droge 2010).

These policies can be fashioned in a manner that it can likewise bolster closer connections between training establishments and the private sector. This is especially imperative for creative business and there are various approaches to accomplish this. To start with, strategy ought to bolster more far-reaching utilization of business visionaries in the conveyance of training by engaging visiting lectures, or via honing and coaching of students. This could likewise incorporate students into the working processes by way of fleeting ventures through start-up weekends. Second, the strategy can empower and bolster the joining of business visionaries into personnel and staff at colleges to bring more enterprise experience into advanced education foundations. Third, the approach can encourage personal part financing and inclusion in business enterprise seats and brood offices at colleges (Isabelle and Drucker, 2013). Fourth, the approach can bolster better coordination between the private part and college start-up bolster offices, which can be expert through drilling and tutoring, furthermore through systems administration occasions and business rivalries. The consideration of the professional instruction and preparing framework requires an alternate methodology from that ordinarily utilized for showing more specialized subjects and suitable strategies for changing lecturing philosophies, and not simply educational module, should be planned (Gibb, 2009).

Van der Kuip and Ingrid Verheul (2003) very rightly state that entrepreneurial qualities to a reasonable extent exist in every individual, nevertheless, these qualities inherent in every individual no matter how little, can be developed further through education, entrepreneurial education to be precise. Jones and English (2004) characterize entrepreneurial training as a strategy of giving individuals the ability to see business opportunities and the understanding, self-regard, knowledge, and ability to follow up on the opportunities. (Kourilsky, 1995) added to the meaning of entrepreneurial education, the teaching opportunity recognition, how the commercialization of a concept is done, the techniques involved in organizing mineral assets in an uncertain situation and how to begin a business, while (Jones and English 2004; Omerzel and Antoncic 2008) educating in different discipline like administration, marketing, information frameworks and finance thereby giving the entrepreneur that balanced knowledge that is necessary for success in entrepreneurship (Molin and Goitom, 2013). Entrepreneurial education is
necessary to entrepreneurship/entrepreneurship identification in that it empowers the (emerging) entrepreneur by increasing knowledge, furnishing the individual with skills necessary for the utilization and maximization of entrepreneurial opportunities that may present themselves.

Some of the tools entrepreneurial education provides to the entrepreneur include, information about labour as well as products in the market, skills required for selling and bargaining, marketing skills, product development skills (Omerzel and Antoncic, 2008), ability to make good plans and decisions when needed, ability to solve problems, ability to organize and communicate well, increases entrepreneurial judgement, provides good understanding of the market and environment around him. These tools entrepreneurship education offers to empower the entrepreneur in assembling tools, developing a strategy and organizing and exploiting opportunities. Besides empowering practicing entrepreneurs, it empowers even aspiring entrepreneurs with the basics of how to start new businesses (Shane, 2003). Shane is of the view that people, who have had entrepreneurial education produce more results, exploit more opportunities that people who lack this education and record an increase in growth rate.

Lorz (2011) cites (Fayolle et al., 2006) who define enterprise instruction program (EIP) as any pedagogical program or procedure of training for entrepreneurial states of mind and proclivity, which includes adding to certain individual qualities. It is in this way not only centred on the prompt production of new organizations. According to (Linan, 2004), there are four various types of business enterprise training programs.

1) *Entrepreneurial alertness Education:* Lorz explains that this form of entrepreneurial education programmes seeks to increase knowledge about entrepreneurship and at the same time influence attitudes that may have an effect on intentions.

2) *Education for Start-Up:* The instruction for start-up curriculum are prepared for folks who before now have ideas that are entrepreneurial in nature and have the need to resolve practical difficulties about becoming entrepreneurs or running a business.

3) *Education for Entrepreneurial Dynamism:* this form of entrepreneurial education was designed with practicing entrepreneurs in mind. It is for entrepreneurs who want to take their businesses to another level through advancing dynamic behaviours after the start-up phase.

4) *Continuing Education for Entrepreneurs:* it is said that learning never ends. The
continuing education for entrepreneurs programme differs from the other programmes in that it depicts long lasting learning programs and spotlights on experienced business people (Linan, 2004).

Lee et al., (2005) suggest in their work, that entrepreneurial education is necessary, and that entrepreneurial endowment can be improved upon, by postnatal tutoring since as they itemizes:

(1) Inherited temperament is not adequate to explicate the disparity.
(2) Majority of the features that have been acknowledged in preceding studies were made attainable through proper education. Against this backdrop, they argue that an individual's identity and capacity can be extraordinarily created by setting of his or her training and determination, and inspiration can be separated by a natal environment where an individual develops. Along these lines, incredibly assorted qualities exist among business visionaries in light of their developing foundation of social, cultural, and instructive habitat (Lee et al., 2005).

2.9.3 Entrepreneurial Experience

Training, Education, and Experience

Entrepreneurial Policies should relate to the rudiments that encourage entrepreneurs’ advancement in preparing programs, as opposed to a strategy for success improvement and business administration aptitudes. In doing as such, training ought to concentrate on circumstance distinguishing proof, risk taking, methodology designing, authority, transaction dialogue, organizing, building vital unions and licensed intellectual property security (Kneebone et al., 2007).

Entrepreneurship by induction where by implication, training policies are capable of providing support for improvement of business enterprise and business abilities in the staff of new growing ventures to encourage the advancement of business and administration efficiency. These aptitudes are required amid an organization's development and having staff outfitted with these abilities can offer organizations some assistance with dealing with challenges as they emerge. Training could be utilized to create group pioneers, grant enterprise abilities crosswise over occupations included in merchandise and procedure development, and increment enterprise administration aptitudes.
2.9.4 Experience

It is noteworthy that scholarly enterprise writings have been reprimanded for providing insufficient information of entrepreneurs' genuine encounters and difficulties (Jennings and McDougald, 2007).

Prior to engaging in entrepreneurship, individuals often acquire relevant experience at employing organizations. Such experience may alter their preferences for entrepreneurship versus organizational employment. But, evidence on the empirical relationship between the accumulation of experience and the rate of entrepreneurship is decidedly mixed (Rider et al., 2013). This study adopts the thinking that only very few entrepreneurs set out to become so without previously taking up paid or unpaid employments. It is still the argument of this research that, although the experience is an essential component of entrepreneurial developments, the creation of opportunity still arises from the conscious and articulate application of the right idea which is produced from creating imaginations.

It has been implied that business aptitudes and experience influence the penchant of people to end up enterprise owners and the probability of their prosperity. There is some proof indicating the significance of these abilities for the inventive business enterprise. The issue of enterprise abilities and capabilities is firmly identified with more extensive inquiries identified with talented work, movement and dispositions toward business. Suitable instruction projects to create entrepreneurial attitudes and organizational training in business enterprise inclinations are viewed as essential. Also, of importance is apprentice type of knowledge which is regarded as learning the trade/job towards becoming an entrepreneur. This tends to give the individual or a group firsthand knowledge, skills and expertise on what being an entrepreneur means.

Skills here allude to the finesse in capacities and limits of individuals who perform undertakings requested of them in a workplace. Abilities can either be common, alluding to generally transferable aptitudes, or particular to certain work capacities, for example, overseeing individuals, organizing, managing danger and vulnerability, or creation of new commodity or service (Tether et al., 2005). Proficiency and experience positively affect business enterprise since they give the premise to an organization's dynamic capacities, the capacity to learn and adjust to changing state of affairs (Teece, 2007).
2.10 The Variable Personality Trait

2.10.1 Personality Traits

\[ Pr(\text{PTEmergence}) \text{is a Bayesian function of } \]
\[ Pr(\text{PT}|\text{Per}, \text{IQ}, \text{LeadershipSkills}, \text{Creativity}, \text{Responsiveness}, \text{Curiosity}, \text{Passion} \text{ and Risk Tolerance}) \text{ ... ... exp2} \]

The probability of entrepreneurial trait for a person through the study of his or her personal qualities is expressed as a joint probability function of the sub-elements of the personality traits variable. The expression above could be interpreted as the likelihood of personality trait given that the probabilistic values of; perseverance, intelligent quotient, leadership skills, creativity, responsiveness, curiosity, passion, and risk tolerance, as abbreviated in the expression are handy.

Academic writing discloses that studies have been carried out in an attempt through a survey to find out through psychometric tests if there exists a distinctive entrepreneurial trait. Shaver and Scott (1991), maintain that these psychometric tests have not been able to discover any clear difference between entrepreneurs and other people who are not entrepreneurs in terms of personality traits. However, (Ardichvili et al., 2003) state that there are two character traits that are connected to the successful identification of entrepreneurial opportunities. Optimism which is self-efficacy and creativity shall both be elaborated next.

2.10.2 Entrepreneurial Optimism

Self-efficacy has been a topic of interest to researchers involved in the subjective investigation of entrepreneurial conduct (Sánchez et al., 2011). Bandura (1994) characterizes self-adequacy (self-efficacy) as one's convictions in their capacities to perform a specific level of activity or coveted results that impact circumstances that influence their lives. One’s belief in their ability to carry out tasks and produce good outcomes is necessary for the identification of entrepreneurial opportunity. The literature reveals that aside other factors involved and necessary for a successful entrepreneurial activity, self-efficacy is one of the reasons why entrepreneurs discover opportunity where other people do not, not especially when other groups of people defines a situation as costly and uncertain. Aside being able to discover entrepreneurial opportunities,
(Vecchio, 2003) and (Trevelyan, 2009) are of the view that optimistic people have a measure of ability and stamina in withstanding obstacles and able also to think of likely solutions to the obstacles, yet persistently remain organized and focused on their goal through it all. That means people with high level of self-efficacy are risk takers. Entrepreneurship implies taking risks.

2.10.3 Creativity

In an attempt to provide insight into the meaning of creativity in entrepreneurship, (Young, 1985) posits that providing a clear-cut definition for the concept of creativity is rather knotty because creativity implies numerous things. He expounds that the word creativity derives from the Latin creare which means to make, and the Greek krainen which means to fulfil. He further illustrates that creativity can be approached in two ways. Firstly, by looking at it as what creative people do, and secondly as what creative people are. In creativity as what creative people do, he explains that the process of creativity involves, the creation of something fresh and novel; and having worth through employing the imagination, thereby converting what is, into something better than what was, or what used to be. The person involved in the creation process gives away the old, that is, what used to be, transforming it and coming up with something new and somewhat different. In doing so, the creator has made his own addition that is distinctive to the things he does, rising above the conventional with the innovative, replacing the outdated with an upgrading, an enhancement, a progress (Young, 1985). Regarding creativity as what creative persons are, he elucidates that in being creative, we actualize our potentials, in being creative, we take a chance at becoming who we can be, and we take a chance at becoming fulfilled. In being creative our (real) person emerges because it is a process that involves self-expression. I noted in agreement with (Ford and Harris, 1992) that creativity is not peculiar to some people or some class or group of people. It does exist in some measure in every human being.

In (Fillis and Rentschler, 2006) their opinion on creativity does not rule out or totally erase the place of tradition or what used to be rather they are of the opinion that in the creative process, reference is made to traditions or conventions. They acknowledge that creativity involves tapping from, and building on what was, has been or used to be tradition, while doing imaginative and uncommon things in order to arrive at beneficial results. So far, the researcher has identified that creativity involves the interplay between the imagination, logical reasoning, intuition, the need to express self, the need to make a change, as well as traditions or conventional ways of doing things as far as it leads to arriving at novel ideas and beneficial results. It necessary to add that creativity as a
process is not complete without a fitting environment. Creativity in the view of (Hunter et al., 2007) is created on the platform of an interface between the individual as well as the situation at hand or problem identified and assisted by fitting environment, and for the sake of emphasis, not forgetting the above mentioned necessary factors involved in the process of inventiveness. Inventiveness is a central element of human insight as a rule. It is grounded in ordinary limits, for example, the relationship of thoughts, reminding, discernment, analogical thinking, seeking an organized problem-space, and reflecting self-feedback. It includes not just an intellectual measurement (the era of new thoughts) additionally inspiration and feeling, and is firmly connected to social setting and personal identity elements (Boden, 1998).

I cannot in this study mention all the various definitions and models of creativity, but must touch on one of the earliest and most popular, which is that of Graham Wallas, whose model of creativity is seen in the view of Torrance in his article (Torrance, 1988) as the starting point and foundation for most of the creative thinking training programs obtainable today. Graham Wallas, a British sociologist and social scientist in the twentieth-century, proposed in his book The Art of Thought, that there are four stages or phases of the creative process: Preparation, Incubation, Illumination, and Verification.

1. **Preparation**: involves an enquiry or exploration in various directions of the area of interest or problem intended to be solved by the entrepreneur. It involves an accumulation of varied information and resources (material and intellectual) related to and necessary for the entrepreneurial process or activity or business as the case may be and from which new ideas will be born. This information and resources gathered as the creativity process progresses will serve as the tools for pursuing the recognized opportunity or the untangling of the problem identified.

Problem identification, although not clearly mentioned as part of Wallas’ stages of creativity, could be mentioned as part of the first stage of the process of creativity. It involves entrepreneurs identifying a problem in the world around them, which they intend to bring a solution to. This stage involves the entrepreneur(s) recognizing a problem, after which they define the problem, and make reasonable shots at decrypting the problem or opportunity staring them in the face. Problem identification may well be seen as a subset of the first stage of the creative process, that it preparation. It is usually after, whether consciously or accidentally, the entrepreneur or intended entrepreneur or emerging entrepreneur recognizes or
identifies a problem in his or her world, that s/he goes into an enquiry or exploration of the problem or area of interest, which is then followed by the gathering of information/resources that it channelled towards the solving of the problem identified. This is followed by the incubation stage of the creative process.

2. **Incubation:** this is the period of insentient processing. It is the process which follows after the preparation stage in which the entrepreneur after gathering information, steps back, distances themselves from the problem consuming them but allowing the mind to mull over and work through the problem on its own accord. In this stage, no direct effort is made to solve the problem identified rather ideas are kept aside to simmer for some time. Wallas explained that the incubation stage is an intentional refrain from conscious thought, and takes two forms: the period of refrain, which is characterized by the individual spending this time on either a mental work on other problems not directly related to the main problem identified or it may be spent as a period of rest from all conscious mental work.

3. **Illumination:** the ‘eureka’ stage, the stage of the remarkable rush of insights. Wallace based on Henri Poincare’s concept of “sudden illumination” who avers that unexpected insight is “an obvious sign of long unconscious preceding exertion”. As a product of prior work, this stage cannot be consciously willed, but can only be welcomed by the subliminal self only after all the resources and information garnered during the preparation stage has hovered generously without restraint during the incubation stage.

4. **Verification:** the implementation stage. This stage is somewhat similar to the first stage in that it is a stage that involves a conscious and premeditated action(s). This stage involves the conscious trying out of the validity of the idea conceived previously, and the trimming down of this idea or ideas to a precise form. It is a stage that involves series of activities that prove whether the insight or stream of insights gotten at the illumination stage actually solves the problem identified in the first stage, and gratifies the need/conditions defined in the preparation stage. It also involves the communication of the selected ideas and approach (Wallas, 1926). Below is the Wallas model of the creative process.
Looking at Figure 2.1 above, I notice that both the preparation and the verification stages are grouped on the same side, the left side of Figure 2.1 while the incubation and illumination stages belong to the right side of the illustration. This is because as Wallas highlighted earlier, the preparation and the verification stages have something in common, that is, both involves a conscious and deliberate set of actions, both belong with our logical while the incubation and the illumination stages are both characterized by unconscious processes that man has little or no control over. Both belong to the intuitive side of the human being. Young (1985) conceives of creativity as the realization or the making real of a potential which draws in the alliance of our logical side and our intuitive side. Subsequent models after that of Wallas in their models and explanation of the creative process sought to create a balance between analysis and imagination.

2.10.4 Creativity and Entrepreneurship

Born and Altink (1996, p.72) define creativity as "building new techniques as an alternative to using standard procedures". (Schumpeter, 1934) was the first to point out a connection between entrepreneurship and creativity. In his perspective, people who are grouped as successful entrepreneurs are people who see what other people do not see or have not seen.

How does creativity fit in, or how does creativity relate to entrepreneurship? Citing (Schumpeter, 1934), who puts forth that entrepreneurial endeavour includes the
completing of new mixes, the creative destruction of a current balance inside of a specific industry, (Amabile, 1997) clarifies that business enterprise is normally characterized in connection to innovation. It is clear from Schumpeter’s statement that entrepreneurship cannot be explained without touching on innovation and creativity. In fact, his words imply that entrepreneurial activity involves creativity and innovation because creativity precedes innovation. Therefore, for there to be a real entrepreneurial activity, there must be creativity and innovation. Thus as Amabile asserts that, the business enterprise is a specific type of innovation, the fruitful execution of inventive thoughts to create another business or another inventiveness inside of a current business. Creativity is necessary for the recognition or identification of entrepreneurial opportunities (Ardichvili et al., 2003).

Amabile (1997) explains the various ways creativity can be found in, or go into entrepreneurship: she explains that it is generally assumed that when creativity is mentioned in a business context, it means that an entrepreneur has had a brand new thought for a specific commodity or service, which is not the same as what used to be or how things used to be done before, and which may be seen as beneficial or appealing to customers. Recall that in the explanation of Wallas’ four stages of creativity, I explained that an individual in the preparation stage after identifying a problem in the world around them gathers information and resources to tackle the problem identified, after which he distances themselves from the problem, not making any direct effort to solve or handle the problem, although the mind is allowed to roam over and around the problem, after which by chance, he stumbles upon an idea, develops a rush of insights that most likely is a resolution to the difficulty acknowledged, a new way to do a thing, to package a product or a new service to render or a new way to render a service for instance. Recall again that in our presentation of the definitions of creativity, I explained that in line with (Fillis and Rentschler’s, 2006), creativity does not always imply a total lack of reference or discarding of traditions of the old way of doing things, but can also in most occasions be an improvement of the old, a building on the old. It involves tapping from the old to create a new or novel idea. Amabile expounds further, that creativity may extend beyond the creation of fundamental initiative for a product or service but can actually manifest itself also in not only or always in the production or creating of a brand new product or service, but may manifest itself in the implementation. She presents examples of creativity presenting itself in the implementation of a product by giving the following examples: novelty can manifest itself in as she mentions: the recognition of new market opportunities, the methodology and the structures that are put in place in order for the
product to be in the market, the gathering or sourcing of resources etc. she claims that for an entrepreneurial activity to be said to be successful it may not need all the above mentioned, but would need no less than, one or some of these types of entrepreneurial innovativeness must be available. (Amabile, 1997) gives a meaning of entrepreneurial creativity as the creation and usage of the novel, fitting thoughts to set up another endeavour (another business or a new program to produce commodities or services). The essential novel, valuable thoughts might need to do with: (a) the products or services themselves, (b) recognizing a business opportunity for the products or services, (c) methods for creating or conveying the products or services, or (d) methods for getting material assets to create or convey the products or services. Her explanation is better understood when the keywords in the meaning of the two words involved are looked at again. Entrepreneurial creativity – creativity is based on new and useful ideas, while entrepreneurial implies the presence of an action which involves putting into use or the execution of the ideas and innovation generated. This means as she makes very clear, entrepreneurial creativity does not necessarily translate into the provision or birth of a whole new commodity or service, but can be created even when a commodity or service is not new or original. Creativity (in Amabile 1997) is seen as the generation of novel and suitable answers for open-ended issues in any space of human action; in the case of entrepreneurial creativity, these original and suitable solutions do not only initiate the creation of a new product or service, but may be generated and used in the process of creating a product or service or the (re)introduction of a product or service (which may even already be in existence). As far as there is an application of new and suitable solutions at one point or the other within the process of the creation of a product or service or its introduction into the market, entrepreneurial creativity is present or achieved. It is needful to touch on (Torrance’s, 1967) view about the four components of creativity (van der Kuip and Ingrid Verheul, 2003):

1) **Fluency**: this refers to quantity. That is a person’s capacity (and resourcefulness) in producing a large number of ideas.

2) **Originality**: this refers to quality. It basically implies a person’s ability to produce novel and uncommon ideas.

3) **Flexibility**: flexibility refers to an individual’s ability to transmute, switch approaches whenever the need arises.

4) **Innovation**: innovation in Torrance’s perspective is the ability to (re)define and perceive in an atypical manner. It is an individual’s ability in choosing to be
different, or handle things differently from the normal or conventional ways of doing things. Creativity through these four elements implies the capacity for an entrepreneur to produce multiple quality ideas which are outstanding and are transmutable. This will give room for sufficient innovative flexibility to allow for adaptation in varying situations.

2.10.5 Passion

Vallerand et al., (2003) explains passion as a firm disposition toward an engagement that individuals like, that they discover imperative, and (Cardon et al., 2009) conceptualize entrepreneurial enthusiasm as deliberately available, extreme affirmative emotions experienced by taking part in entrepreneurial exercises connected with roles that are important and striking to the self-personality of the business visionary.

There seem to be different perspectives to enterprise passion as mentioned in (Cardon et al., 2009), social psychologists conceive of passion as a feeling that encourages extreme, flow-like situation of complete absorption in one’s conducts (Csikszentmihalyi, 1990), another perception is that of (Vallerand et al., 2003) who see passion as being something which is seen in the amount of energy and time people put in certain activities they label as important. Frijda, (2005) is of the opinion that passion is trigger to that goal that are emotionally important and which control and steers a person’s desires, thoughts, plans, and behaviours, and endures over a period of times, not minding the costs, external barriers as well as moral objections. (Cardon et al., 2009) summarizes these perspectives to say that passion regularly involves emotions that are heavy, overwhelming, and inundated with aspiration. The psychological perspective presents passion as the force that provides people with a sense of satisfaction and assurance (Rockwell, 2002). (Belitz and Lundstrom, 1997, p.57). Think that passion keeps people busy and occupied “wholeheartedly with what they love”

The scholarly view of passion places it on the same level with feelings like excitement, and joy, which are feelings that are very deep, strong and positive. Nevertheless, they differentiate passion from intense and negative states like a state of being distress, saddened, wounded and stressed. The scholarly view of passion also sets passion apart from states that are not in any way intense, like a state of being exhausted or tired. Yet again they differentiate passion from feelings or states that are although positive, are not intense, like being content or at ease. Drawing from the views of scholars like (Damasio,
2003), (Schwarz and Clore, 2007) and (Cardon et al., 2009) who aver that passion as a feeling, is an act which involves consciously experienced changes in inner emotional state that are ascribed to outer stimuli and are exertion completely reflected upon and put away intellectually for later recovery. They further add that reflection in terms of the meaning of passion may well include self-awareness, which probe into what the individual is physically feeling, appraisals which explore into why an individual is feeling the particular manner they are feeling, as well as the cause of the feeling; and categorization which makes an enquiry into how this particular feeling compares with other feelings. They argue that entrepreneurial passion as a feeling is distinct from episodic changes in core affect. They expound further arguing that regarding core effect, episodic changes differs from passion because unconsciously or subconsciously triggered by peripheral things or external activities which may be unmoving or unrelated or unimportant to the identity meaning of an individual. Passion, on the contrary, is characterized by a deep longing that a person feels or experiences for substances or activities which may be genuine, existent, remembered, desired, envisioned, or expected, yet have a deep meaning and connection to the person’s distinctiveness (Cardon et al., 2009).

Regarding passion and entrepreneurship, (Cardon et al., 2009) interestingly contend that enthusiasm (passion) is stirred not on the grounds that a few business people are inalienable arranged to such sentiments be that as it may, rather, on the grounds that they are occupied with something that identifies with a significant and remarkable self-character for them. (Murnieks and Mosakowski, 2006) touching on personalities, keep up that passion surfaces when a wide entrepreneurial role character is huge. personality, as is seen by Burke and Reitzes (1991), is characterized as disguised assumptions about those qualities people hold as focal, particular, and persisting about them and that are in any event mostly reflected in the actions they authorize. In underlining the part of character referring to passion, (Cardon et al., 2009) built up the idea of unmistakable entrepreneurial personalities that are connected to specific exercises. They recommend three part characters:

1. **The inventor identity:** by this they mean a situation whereby the passion of the entrepreneur is directed at those activities that involve the identification, the invention and exploration of new opportunities.
(2) **The founder identity**: by this they refer to a situation where the passion of the entrepreneur is directed at or centred on the establishment of a venture that is basically for the commercialization and the exploitation of opportunities.

(3) **The developer identity**: this, they state refer to situations where the passion of the entrepreneur goes to activities that are linked to the nurturing, growing and expansion of a venture after it has been created.

It is necessary to mention, that they add that while some entrepreneurs will be passionate in all three, some may be in two while some others may consider one identity as more important or relevant in meaning to them than the others. Whichever personality an entrepreneur considers more relevant at a time, there is the possibility of switching roles. That is, as time passes, an entrepreneur’s view may change regarding which identity role is more salient and central than the others although at particular times depending on the situations around them, and the situations they find themselves in. Citing (Stryker and Burke, 2000), (Cardon et al., 2009) declare that the self is made out of multifaceted characters, personality hypothesis recognizes that, for any individual, personalities are sorted out progressively such that a personality set higher in the pecking order is more striking and more integral to self-significance than those set lower. This means that an entrepreneur’s commitment to certain activities or actions per time like creating, exploring, inventing etc depends on which particular identity role they consider to be more salient and central. As said earlier, there is room or possibility for role switching over time because there is the possibility of the entrepreneur changing the relevance or relative importance of an identity role. Nevertheless, these roles do not just change so easily and just at one time. The salience of responsibility and personality is actually steady to an extent, which makes the self-meaning of an entrepreneur distinguishing and consistent for just a time. It is this uniqueness and relevance of role identity that motivates entrepreneurs into being involved in some activities, while not going into or disembarking from others.

The motivation for actions springs from identities; it is these actions for instance in entrepreneurship or business, that lead to self-validation of self-meaning. This means that people get their social categories from role identities. It doesn’t end there, as role identities categorize people into social categories, people are then egged on to keep up and substantiate their self-meaning through getting involved in actions and relating with the public in ways that authenticate the role expectations and corroborates the behavioural implication of significant communal categories.
2.10.6 Intelligence Quotient

Albert Einstein once said, the genuine indication of insight is not learning but rather creative energy. Socrates also once said, I realize that I am shrewd, in light of the fact that I realize that I know nothing. For hundreds of years, rationalists have attempted to pinpoint the genuine measure of intellect. All the more as of late, neuroscientists have entered the level headed discussion, hunting down answers about knowledge from an experimental point of view: What makes a few brains more intelligent than others? Are astute individuals better at putting away and recovering recollections? On the other hand, maybe their neurons have more associations permitting them to innovatively consolidate disparate thoughts? How does the terminating of minuscule neurons lead to the flashes of insight?

2.10.7 What is intelligence?

Intelligent Quotient (IQ) is along these lines, a measure of your thinking and critical thinking capacity which can be seen as a division of a steady proportion of mental age separated by ordered age. It is a division of 100 times the mental age (MA) by chronological age (CA). This can be presented as \(100(MA)/CA = IQ\). An IQ score is by and large seen as how much an individual knows in connection to his or her age peers. It is additionally imagined just like, a measure of what analysts call our "liquid and solidified knowledge." In measuring IQ, a therapist uses an acknowledged test technique to investigate one's visual, numerical and dialect capacities and additionally person's memory and data handling speed.

It is consequently a general conviction that anybody with a higher score of IQ as measured will be able to control, prepare and decipher data at a more profound level and a higher pace than the normal individual.

Emotional intelligence or emotional quotient is viewed in this research as the ability of entrepreneurs to correctly distinguish different human feelings by labelling them properly and utilizing accumulated enthusiastic data to guide speculation and conduct. (Goleman, 1995) considers enthusiastic knowledge as capacities, for example, having the capacity to inspire oneself and hold on despite disappointments; to control motivation and defer delight; to manage one's state of mind and keep dilemma from overwhelming the capacity to think: to relate, to trust. (Buddy et al., 2004) include that the principal ranges of passionate knowledge incorporate knowing one's feelings, overseeing feelings, rousing oneself, perceiving feelings in others, and taking care of connections.
There are different classifications and theories of intelligence in the literature stemming from different approaches to thinking which has produced various perspectives and assumptions some of them include: the faculty theory, one actor/UNI factor theory, Spearman’s two-factor theory, Thorndike's multifaceted proposition, Thurstone's hypothesis: essential mental capacities/bunch variable proposition, Vernon's progressive supposition, Guilford's model of structure of wits, Cattell's liquid and solidified supposition, Gardener's proposition of multiple insight, Sternberg's triarchic hypothesis, Anderson’s theory: cognitive development, Eysenck’s structural theory, Ceci’s biological theory, and theory of emotional intelligence. While not all these theories and perspectives have relevance to this study, some of them do. For instance, Sternberg’s triarchic theory (Stemberg, 1985) which is a three-pronged theory of intelligence propounded by Robert Sternberg which presents three types of intelligence: analytical intelligence which is defined by (Pal et al., 2004) as what people, for the most part, consider as scholastic capacities. It empowers us to tackle issues and to get new information. Problem-solving abilities incorporate encoding data, joining and looking at bits of data and producing an answer. The second kind of insight as indicated by Sternberg's hypothesis is inventive knowledge which is clarified by (Pal et al. 2004) as the capacities to adapt to novel circumstances and to benefit as a matter of fact. The capacity to rapidly relate novel circumstances to well-known circumstances (that is, to see similitude and contrasts) encourages adjustment. In addition, as an after-effect of experience, people likewise get to be ready to take care of issues all the more quickly. The third is functional insight otherwise called road smarts. It is additionally characterized by (Pal et al., 2004) as that which empowers individuals to adjust to the requests of their surroundings. Howard Gardner likewise presents the hypothesis of multiple knowledge. He contends in his book, Frames of Mind, The Theory of Multiple Intelligence (1983) as pushed by (Pal et al., 2004), that we are all conceived with potential to add to a variety of insight, the greater part of which have been disregarded in our testing society, and all of which can be summed up into making us equipped people. By Gardner's hypothesis, individuals have nine sorts of knowledge: etymological, sensible scientific, musical, spatial, interpersonal, intrapersonal, naturalistic, substantial kinaesthetic and existential insight. In any case, I have considered all insight as same keeping in mind the end goal is to allow us to measure it as a variable.
2.10.8 Persistence

Persistence is a personality trait which is measured in the Temperament and Character Inventory (TCI) and is considered one of the four temperament traits (Eagerness of effort, Work hardiness, Ambitious, and Perfectionist). Persistence refers to perseverance in spite of fatigue or frustration and can also be measured as the time invested in staying on task. Performance persistence for instance, among entrepreneurs or business start-ups, is typically taken as proof of ability. This is absolutely the most direct clarification of four-fold elements of entrepreneurial traits of eagerness, work hardiness, ambition, and perfectionism. However, the perception of performance, the conviction that those fruitful business visionaries are more talented than unsuccessful ones can actuate genuine execution ingenuity.

2.10.9 Leadership Skills

Leadership has customarily been seen as a particularly interpersonal wonder exhibited in the communications in the middle of pioneers and subordinates. The hypothesis of administration exhibited in this article suggests that viable initiative conducted on a very basic level relies on the pioneer's capacity to comprehend the sorts of complex social issues that emerge in associations.

In (Jermier, 1995) Yukl expressed that; impact is the substance of leadership. It was likewise agreed that a standout amongst the most essential and troublesome initiative obligations is driving change. In talking about the change procedures, accentuation was put on social change. The creation and foundation of an unmistakable and convincing vision are valuable to control the association through change, and the pre-imperative arrangement of rules is incorporated for defining a dream.

2.10.10 Risk Tolerance

Much work on entrepreneurial firms has concentrated on access to credit, and little is thought about the role of uncertainty tendencies. There is no doubt that risk taking capacity is an important measure of intending business investors or entrepreneurs. Therefore, as has been carefully described in the hypothetical models of (Kanbur, 1979) as well as (Kihlstrom and La§ont, 1979), Hvide agrees that less uncertainty opposed people get to be business people, and more risk disinclined people get to be labourers. An extra speculation that takes after from the hypothesis is that less risk opposed people are
prone to perform more terrible as business persons (Hvide and Panos, 2013).

The relationship in the middle of uncertainty and enterprise might rather be entirely
diverse since risk tolerant individuals do not search out the enterprise. Rather, business
people figure out how to handle uncertainty as a major aspect of running their
organizations, and all the while, turn out to be generally alright with it. Individual
eagerness to take work-related risks changes after some time, and it changes
contrastingly for individuals who get to be business people than for non-business people
(Hanna et al., 2001).

All fields of human activity use estimation in some structure, and every field has its own
arrangement of measuring devices and procedures. Measuring a mental quality, for
example, risk resilience includes specific difficulties on the grounds that, firstly, there is
no physical indication of the characteristic and, also, there is no normal unit of
estimation. However, this research employs a questionnaire with the simple scale to
measure the beliefs of entrepreneurs about the aversion to risk with a score ranging from
very high (scoring number 5) to very low (scoring number 1).

2.10.11 Responsiveness

Being responsive in entrepreneurial correspondence has an exceptionally vital and is
completely basic for making better connections, trust, and compatibility with individuals
in the family and at work or business. It could be regarded as the ability of an
entrepreneur to adjust to the sudden change in business, environmental or economic
conditions. It reflects a degree of sensitivity which an entrepreneur might have towards
the search for opportunity or taking on it when perceived. The readiness to engage an
opportunity can also be considered as responsiveness.

2.10.12 Perseverance

The reality of life teaches us that every monumental endeavour can mostly be achieved in
increments. In the business circle, perseverance (constancy) implies slanting forward,
strolling one foot after the other into the chill entrepreneurial wind until one has achieved
set goals of reference and in the end accomplished proposed objective. It is that element
of endurance and determination which every intending entrepreneur must possess to be
able to remain resolute in achieving success.

Entrepreneurial history is brimming with examples of overcoming adversity by the
individuals who stayed sufficiently long enough and tread along quietly. Independent of
the considerable number of obstructions and misfortunes that come in their direction, it's
essential that they do not take their eyes off their objective.
2.11 The Variable Social Network

The social network of an entrepreneur to a large extent influences their thoughts and perception about the immediate environment and how to recognize trends that create opportunities given the social circle they belong to.

2.11.1 Social Network

Pr(SNEmergence) is a Bayesian function of Pr(SN| Income and Family) ........ exp3

The expression above illustrates a prediction by probability the emergent value of social network given the probabilistic values of entrepreneurs’ income (financial status) or family background or orientation. (Mitchell, 1973) defines a social network as the real arrangement of connections of various sorts amongst an arrangement of people, while (Nelson, 1988) considers it as a sets of ties connecting a few influencing factors. (Jack, 2009) notes that links like friendship, group obligations, strong and weak ties furnish members of a particular network with valuable information, it gives them an access to opportunities, and empowers people to gain resources (financial or physical) that may be hard to access, or that they may not have been privy to if they weren’t part of the network. (Hoang and Antoncic, 2003) explained that network, in relation to entrepreneurship refers to an arrangement of factors and some arrangement of connections that connects them. By actors, they mean people or organizations. Jack explained that such networks aid entrepreneurship in that, relations with socializing agents propels an entrepreneur. In her view, Networks represent the shared connections framed by people inside of firms, with different firms and with different associations. Organizing itself includes a social procedure which happens after some time (Jack, 2005), and (Jack, 2009). She also includes that it is a procedure of recognizing normal hobbies, picking up learning and experience of different people and building believe, a pivotal component of systems network. Networking as an action has been disclosed to mean a framework by which business people can tap assets that are outside to them, i.e. that they do not control Jarillon (in Jack, 2009). Casson (in Tesfom, 2006) characterizes a network as an arrangement of high trust connections which either straightforwardly or in a roundabout way interface together everybody in a social gathering.

Stuart and Sorenson (2005) state that social networks are very important to the
entrepreneurial process because they serve as, and provide channels through which private data streams. They include that to the degree that people possess heterogeneous positions in systems, they shift in their utilisation of this data. Furthermore, to the extent that the acknowledgment of entrepreneurial possibilities relies on access to private data, contrasts in network positions can in this way clarify a great part of the inter-individual changes in access to the information required to perceive alluring opportunities for new pursuits. Aside the fact that social networks provide a channel through which information passes and is shared between people, between entrepreneurs and the world around them, social networks also facilitate the mobilization of resources. (Stuart and Sorenson, 2005) explain that the role of social networks is much more important in these times in which the survival chances of firms are minimal. They outline, in accordance with the literature, the benefits of a rich social network to an emerging entrepreneur. Firstly, a rich social network exerts a pull on financial capital to the entrepreneur. Secondly, a rich social network aids in the recruitment of skilled labour. Thirdly, a rich social network provides an access to tacit knowledge.

To add to the above benefits of a social network to entrepreneurship, or an emerging entrepreneur, (Jack, 2009) states the following. A social network, in terms of relations with socializing agents, serves as an incentive to an entrepreneur. A social network activates existing social relationships and creates new ones for the acquisition of the resources necessary for entrepreneurial activity. Hence, the description of societal associations as a catalyst to entrepreneurial undertakings especially in the way information and resources gathered via these social networks covers for the effects of, or the damages caused by environmental constraints thereby aiding the entrepreneurial process Brüderl and Preisendörfer (in Jack, 2009). Brüderl and Preisendörfer further re-echo that a network has been depicted as a standout amongst the most intense resources a business person can have as it gives access to power, data, information, capital and different systems (Jack, 2009).

2.11.2 Income

Individual wage or personal income is a measure of compensation got from wages and salaries, profits, rental pay, and so forth. All are measured in some real fiscal qualities (such as Dollars) and normally communicated in rate terms. There is an idea that an elevated income rate of wage per capita permits individuals who might in some way or another been in paid work to end up inventive, autonomous, and embrace uncertainty by
taking part in business enterprise development (Robert et al., 1998). This is, however, debatable.

It appears to be exceptionally customary to hope to locate an extensive number of necessity business visionaries in poor nations and then some opportunity entrepreneurs in rich nations. As it were, as livelihoods increment and individuals can fulfil their essential needs, more individuals might take part in the circumstantial business enterprise in accordance with Maslow's Hierarchy of Needs Theory. This procedure proposes a raised relationship in the middle of enterprise and salary with large amounts of business at both low and high wage levels (Robert et al., 1998).

This evaluation is important for policymaking in Africa and economically growing nations when all is said and done where nations are at various levels of per capital income and require diverse approaches with a specific end goal to cultivate business enterprise and employment creation.

2.11.3 Family

The family embeddedness point of view on enterprise activity suggests that scientists need to incorporate family measurements in their conceptualizing and demonstrating, their testing and analysing, and their interpretations and suggestions avers (Aldrich and Cliff, 2003).

It is the developing enthusiasm for the socio-social connection of enterprise, however, which has prompted elevated attention to the significance of familial connections to the business person, and particularly when considered from the informal organization point of view.

Strong tie system contacts are those individuals with whom the business visionary has a bonding individual relationship, and with whom they communicate oftentimes. Weak ties, then again, are more far off inwardly, and might just be initiated rarely. Concrete tie contacts are regular companions or family though frail bonds will probably be characterized as business partners. Solid bonds have been found to give great assets. Particularly data which are frequently not economically accessible, and which is extremely very much centred on the particular needs of the business visionary and their business (Granovetter, 1985).
2.12 The Variable Environment

The environment is a key determinant of the type of opportunities that avails whether latent or readily identifiable. Therefore, opportunities emerge to suit the prevailing economic, social and development level in the hosting environment.

2.12.1 Business and economic environment

Business enterprise drives financial change and advancement while in the meantime extending opportunity and unleashing the activity of citizenry. Business visionaries are essential to building prosperous social orders that convey chance to all. In rising economies around the globe, enthusiasm for the enterprise is as of now higher than any time in recent memory in the midst of expanding youth populace and the yearning to climb income ladder according to (Shirley, 2013).

Rationalisation recommends, and scholastic studies concur, that an ameliorative business environment empowers entrepreneurial activities and supports undertaking execution. A contextual investigation of the south-eastern Nigeria demonstrate that organizations endure wretchedly because of denied basic facilities, access to loans, bureaucratic procedures and administrative strategy, in this manner the business atmosphere in southeast Nigeria is distressing, thus has the ability to restrict entrepreneurial engagements. This unpleasant commercial atmosphere, which is in existence across the country, constitutes snags to Nigeria's industrial advancement. Lamentably, in numerous creating economies, hindrances in the business environment close-off entrepreneurial chances to colossal swathes of the populace. For instance, a rustic Kenyan business person must acquire the expense of travel to Nairobi to enlist a business. In Lebanon, 65 percent of little and medium-sized undertakings must pay an inducement to access government services. Tunisian road sellers, a large portion of whom cannot accomplish legitimate status, live in consistent trepidation of being expelled or bothered by nearby authorities. Even insolvency can be viewed as a wrongdoing in a few societies (Shirley, 2013).

In this study, the economic environment is defined by the following factors; Political, Developmental, Cultural and Economic environments as a mixture at varying proportions.

\[ \text{Pr}(\text{EVEmergence}) \text{ is a Bayesian function of} \]
Since the economic environment is a function of the factors enumerated above, the expression is translated to mean the probability of predicting the economic atmosphere in a commercial society given the probabilistic estimation of the political, cultural, economic and developmental state of the environment.

2.12.2 Political

The world has changed, and people should change alongside it. We are living in an energizing time of far-reaching advanced and social boondocks, where old standards and convictions are disintegrating under the heaviness of parasitic frameworks and corruption, offering a reason for insightful people scanning for new answers and enhancements. Up to this point, the planners of these developments have for the most part rotated around new technology companies, product design, green occupations, renewable power, and media. Yet one range that frantically needs new advancement and crisp thoughts are maybe the one most dismissed: governmental issues (politics). Considering the current political atmosphere is a decent place to begin to figure out if legislative strategies getting through the pipeline will be strong or wind up breaking the recently hailed spine of the business person. Since numerous business visionaries run little organizations, political decisions, as a rule, have a more noteworthy rate sway on the organization's main concern. For example, the following concerns continually worry entrepreneurs as they plan to and undertake projects for business growth. It should be noted that it is a case study of Nigerian business and political environment.

- **Inflation** - fundamentally controlled by the loan cost policies set by the legislature.
- **Poor sales** - for the most part owing to monetary conditions which can be the center of legislative boost.
- **Interest rates** - a result of the financial arrangements of the legislature.
- **The cost of labour** - expanded through commands and legitimate prerequisites for representative advantages.
- **Government regulation and Formality** - touches numerous territories of small business enterprises, including licensure, accreditation, and obtaining permits.
2.12.3 Development level

Global development is tending towards a stage where the business enterprise will progressively assume an essential part. There are no less than three purposes behind this, each particular to types of nations. Firstly, in the West, the managed financial system of the 1970s-2000s, characterised by reliance on enormous commerce and large scale manufacturing, has given way to a supposed entrepreneurial economy. Here information driven products and services are presently all the more adaptable given by smaller firms, and the development of an innovative class requires a less meddling, nevertheless, all the more promising state.

Besides, in the developing nations, most remarkably the BRICs – Brazil, Russia, India, China – noteworthy growth has been driven by an absolute entrepreneurial revolution. The need in these economies to supervise development through maintainable access to assets, learning, markets, and low-carbon industrialization puts a premium on the creative business enterprise.

At last, in the least industrialised nations, where reliance on assistance is high, donors have been moving the accentuation being developed participation towards private segment improvement. In a number of these nations, including resource-poor North African nations, populaces comprise of numerous youngsters who see little prospects of picking up employment with not too bad wages. Advancing youth business here has turned into an indispensable strategic goal of numerous development associations and benefactors.

2.12.4 Cultural

The definition of culture abounds in the literature, particularly from the field of anthropology, but interestingly, the definition of culture through time and even now is structured by the interest of the individual studying it and is created within the limits of that person’s interest or focus of study. But due to the relevance of culture to entrepreneurship emergence, I present some definitions to guide in the exploration of the relevance of culture to entrepreneurship emergence.

- Culture is that multifaceted whole which incorporates information, belief, art, law, principles or right and wrong, habitual practices, and any other aptitude and will not acquired by people as individuals that belong to a society (Tylor, 1871).
- The culture of any group of people comprises of the sum whole of ideas, adapted emotional reactions, and examples of habitual conducts which the individuals
from that society have obtained through training, education or imitation and which they share to a larger or less degree (Linton, 1936).

- Culture comprises of patterns, overt and implied, of conducts gained and for conducts gained and conveyed by symbols, composing the particular accomplishments of human societies, incorporating their embodiment in artefacts. The key centre of culture is made up of traditional (i.e. historically obtained and chosen) ideas and principally their joined qualities. Culture systems can from one perspective be seen as results of action, and alternatively as conditional components of future action. (Kroeber and Kluckhohn, 1952) and cited by (Adler, 1997).

- Kroeber and Parsons (1958) considers culture to mean conveyed, passed on and generated information and patterns of values, thoughts, and other symbolic-significant structures as features in the moulding of individual conduct.

- White also in his paper (White, 1959) sees culture as an extra-somatic, fleeting range or continuous series of things and events.

- A culture is an aggregate socially obtained way of life of a group of individuals. It is made up of the structured recurring ways of thinking, emotion, and behaving that are typical or seen as normal of the people of a specific social order or part of a society (Harris, 1975).

- Bamouw (1978) as cited in (Uhlaner and Thurik, 2004) presents culture as the make-up of versions of learned behaviour held as a standard, and which are passed on from one age band to the next.

- Culture touches upon cultivated, accrued experience. A culture alludes to those socially transmitted patterns for behaviour normal and peculiar to a specific social group (Keesing, 1981).

- Culture involves the offshoots of experience, may or may not be largely coordinated, cultivated or made by the people of a populace, along with those images or encryptions and their translations (meanings) passed down from previous generations, from colleagues, or formed by people themselves. As stated by (Schwartz, 1992) and cited by (Avruch, 1998).

- Hofstede (1994) articulated culture as the total programming of the mind which perceives the people from one group or classification of people from another. He distinguished four measurements of society which incorporates: independence (Individualism), manliness (Masculinity), power separation (Power distance), and vulnerability evasion (Uncertainty avoidance).
Additionally as the arrangement of states of mind, qualities, convictions, and practices shared by a gathering of individuals, yet distinctive for every person, imparted starting with one era then onto the next. Says (Matsumoto, 1996).

Culture implies the entire complex of conventional conduct which has been produced by mankind and is progressively learned by every era. A societal culture is less exact. It can mean the types of customary conduct which are normal for a given society, or of a gathering of social orders, or of a specific race, or of a certain place, or of a specific timeframe avers Mead (2002) and cited in (Brumann, 1999).

Culture is a fluffy arrangement of fundamental presumptions and qualities, introductions to lifestyles, convictions, approaches, techniques and behavioural traditions that are shared by a gathering of individuals, and that impact (however do not decide) every member's conduct and their understandings of the significance of other individuals' conduct. Agrees (Spencer-Oatey, 2008).

These multiple perspectives to what culture means and the personalisation of the definition largely shows a lack of agreement and consequentially lack of understanding on this subject or perhaps its influence on the subject being considered. However for this research, culture is viewed as all traditional behaviours, whether learnt, borrowed or adapted and that have a direct influence on the behaviour of entrepreneurs in a society which is capable of affecting their cognition and opportunity sensing capacities.

**Individualism (IDV):** is a dimension of culture which points out how people define themselves as well as their relationship with other people. It surveys of cultures from slackly structured to firmly integrated, that is individualism against collectivism. It identifies with social orders in which the ties between individuals are free: everyone is depended upon to deal with themselves and their close relatives (Jennings and McDougald, 2007) and (Anderson and Jack, n.d.). A society with a high individualism status is that society in which uniqueness and the rights of individuals are supreme in the society. And a low individualism ranking society is that society that has a collectivist nature and having close ties among its members. He avows that in low individualism societies (that is, collectivist cultures), individuals from inception onwards are integrated into solid, firm in-gatherings, which all through individuals' existence keeps on securing them in return for absolute reliability (Hofstede, 1994). Individualism exists in societies where importance is placed on self and independence, and the communal interests
override personal benefits while collectivism exists in societies where importance is placed on mutually dependent social units like the family (personal relationships) instead on the self as is found in societies with high ranking individualism. In collectivist societies, the enthusiasm of the gathering comes after the enthusiasm of any single person. In spite of the fact that as said before, in individualistic social orders, individuals take care of themselves and their relatives while in collectivistic societies, individuals are a member of gatherings that deal with them consequently for reliability (Hofstede, 1997). (Masakazu, 1994) characterizes present-day individualism as a perspective of mankind that legitimizes inward convictions and one-sided self-statement, and in addition, rivalry taking into accounts these.

In terms of goal setting in the individualist culture and the collectivist culture, a line of difference is seen between who is more considered. In the latter, goals are set with a high consideration of groups in the society, whereas in the former, goals are set with the self and the family being highly considered, and with little or no consideration for groups. The United States of America, Great Britain, and Canada are illustrations of an individualist society. They are high individualism ranking societies while Columbia Venezuela, Panama, Ecuador, Guatemala are examples of a collectivist society. They are low individualism ranking societies (Hofstede, 2001).

For the reason that individualistic societies or cultures are characterized by love for freedom, independence, materialistic success and individual interests, such cultures are more accommodating of entrepreneurial activity or display high rates of entrepreneurship while in Hofstede’s opinion, collectivist culture which is known for interdependence, commitment to the pursuit of group goals instead of individual goals, and group conformity may not display high rates of entrepreneurship (Gupta et al. 2010; Shinnar et al. 2012).

**Masculinity** (MAS): refers to the extent to which a culture’s dominant ideals are assertive or promoted. Drawing from the societal roles of both men and women in different cultures, Hofstede grouped cultures into two: masculine cultures and feminine cultures. Masculine cultures are cultures characterized by a striving for a high division between what men and women are expected to do. Cultures defined as being masculine, are those cultures that highly regard on assertiveness, competition and material success, and the cultured tagged feminine are those cultures that highly regard the worth of life and people, interpersonal connections and concerns over the feeble (Hofstede, 1980).
Countries like Japan, Austria, Venezuela, and Italy are grouped as mannish ranking countries while countries like Denmark, The Netherlands, Norway and Sweden Belong to the low masculine ranking cultures according to (Hofstede, 2001).

**Power Distance (PDI):** simply means the distribution of influence in a community. (Hofstede 1997) defines power distance as the degree to which fewer capable individuals who belong to associations and societies in a nation expect and acknowledge that power is circulated inequitably. Hofstede is of the belief that the home or family is the first place in which power distance is impacted/taught and learned. High power distant cultures are characterized by respect for parents as well as respect for people of high status. As expounded by Hofstede, power distance also implies the degree to which power, status, and (material) possessions are shared out among the people in society. (Soares et al., 2007) defines power distance as a dimension that mirrors the results of power imbalance and authority relations in society. It impacts hierarchy and reliance relationships in the family and organizational settings. As highlighted in (Li and Harrison, 2008) and (Schwartz, 1994), nations with high power distance like China are known for their towering levels of hierarchy, vertical communication patterns, and centralization of power while nations like Denmark with low PDI display low levels of hierarchy, horizontal communication, and decentralization power. Hence, it is not uncommon to find people in high power distant cultures preferring business take over than business start-up because to take over a business of firm requires that the individual is willing to agree to a particular already established hierarchy, agreeing to introduce changes carefully and gradually (Block and Walter, 2011). Examples of power distance cultures include Malaysia, Guatemala, Panama and Philippines while some low power distance ranking cultures include: New Zealand, Denmark, Israel and Austria (Hofstede, 2001). (Busenitz and Lau, 1996) as mentioned in (Shinnar, 2012) state that high power distance promotes entrepreneurial activity.

**Uncertainty Avoidance (UAI):** is the degree to which a society tolerates indistinctness and accepts the risk. It is the degree to which tradition or society feel endangered by uncertainties or the indefinite, the degree to which its people feel either uncomfortable or pleasing in irregular situations. Unstructured circumstances are new, unfamiliar, unexpected, and poles apart from accustomed or regular situations (Block and Walter, 2011). It means the degree to which people feel undermined by uncertainty and unclear situations and try to steer clear of these situations (Hofstede 1991). It is an approach that handles the requirement for clear-cut rules for approved behaviour (Soares et al., 2007).
National cultures like Greece, Portugal, Guatemala, Uruguay and Belgium who are a high ranking uncertainty avoidance cultures make efforts to avoid uncertain or unknown situations by keeping up with stringent codes of conduct and a trust in utter truths. Germany, for instance, makes efforts to avoid unstructured situations by making a lot of thorough planning, having a preference for order and certainty rather than uncertainties or unknown situations. They are aggressive, emotional, irrational, love to seek for security and intolerant. Whereas cultures like Hong Kong, Sweden, Denmark, Jamaica and Singapore which are strong in uncertainty avoidance (that is low uncertainty avoidance ranking societies) are more adventurous, capable of accepting personal risks, somewhat tolerant (Hofstede, 2001).

In their view (Block and Walter, 2011), people who belong to cultures uncomfortable with uncertainties, ambiguities, and unknown situations should have a preference for taking over already running businesses instead of going for businesses that would start from the scratch. They aver that being a business person through taking over an enterprise or business activity is linked to lower degrees of risks as opposed to the process of starting a new business. Starting a new firm requires that the business person must have the will power and readiness of the mind to take risks and withstand uncomfortable and unknown situations. Although taking over an established business or starting up one from scratch are both entrepreneurship, starting up new ones are more demanding and requires more to develop over time, in addition to the fact that it may or may not succeed, while an already established business had to a far extent been confirmed to be successful at least more potentially successful that a business from scratch.

**Long-Term Versus Short-Term Orientation (LTO):** This, an extension of Hofstede’s work on the dimensions of culture. This dimension stands for a range of Confucian-like ideas/values and was formerly referred to as Confucian dynamism but recently known as long-term orientation versus short-term orientation to life (Hofstede 1991; Soares et al. 2007). Hofstede states that the values on both the long-term orientation and the short-term orientation do seem to stem directly from the ideas and teaching of Confucius. He further explains that the values on the one pole are more arranged towards the future particularly determination and frugality; they are changing and active. The values on the other pole are more inclined towards the past and present; they are more stationary, unchanging and inactive (Hofstede, 1991). Hofstede presents the definition of the LTO-dimension thus: Long Term Orientation stands for the fostering of virtues tending
towards future rewards, especially, determination and prudence. Its opposite pole, Short Term Orientation, stands for promoting virtues identified with the past and the present, specifically, regard for tradition, safeguarding of face as well as satisfying social responsibilities. (Fang, 2003) explains further in line with Hofstede, that the long-term orientation alludes to a positive, changing, and future inclined culture connected with four ‘positive’ Confucian values: determination; setting up and coordinating relationships by status and observing this set up; frugality; and having a sense of shame. While the short-term orientation submits an unhelpful, stationary, conventional and past-oriented culture connected with four ‘negative’ Confucian values: personal dependability – having an unaltering quality and stability; saving face; regard for tradition; and exchange of greetings, favours, and gifts (Fang 2003).

Expounding further, (Block and Walter, 2011) explain in line with (Hofstede, 2003), that people interested in businesses in long-term oriented cultures are prone to taking over already established businesses than starting up new ones, and are very comfortable with saving rather than just spending away capital. Long-term orientation promotes thrift, savings, doggedness toward results, and a readiness to subordinate oneself for a reason. Whereas short-term orientation means being steadfast in spending to meet up with social demands, a reduced amount of savings, having a liking for swift results, and a concern with a face. Examples of long-term orientations ranking countries include Hong Kong, Taiwan, Japan, South Korea, and China. These are the top five long-term orientation countries.

2.12.5 Economy

Previous couple of decades has seen an abundance of studies analysing the determinants of entrepreneurship at both empirical and theoretical standpoints. Also extensively discussed in the literature are the consequences of economic performance on entrepreneurship. Although divergent units of observations have been used in the literature i.e. firm, region, business types, countries etc, in which fiscal development is calibrated in terms of firm expansion and continued existence. A more astounding knowledge has emerged that new and smaller firms grow methodically bigger than already huge or established status avers (Carree and Thurik, 2003).
The financial aspect of venture explains how fiscal conditions and impetuses impact business, and how the exercises of business visionaries along these lines impact the most extensive economy. For instance, the exchange off between expected cash related returns and the threats of those benefits impact the decisions of employees to wind up entrepreneurs. Similarly, this trade-off and financial motivating factors all the more by and large impact the contracting and venture decisions that entrepreneurs make when they develop and build up their associations. Meanwhile, business decisions impact complete wealth hoarding in the economy while business visionaries' enrolling decisions impact an economy's aggregate occupations and unemployment rates.

The fiscal matter of business additionally examines:

- The impacts of borrowing limitations on rates of entrepreneurial start-ups and sustenance;
- The function accomplished by business persons in empowering job and growth in the economy;
- The existence of business sector dissatisfactions in entrepreneurial economies and the extension for policy arrangement to plan tasks to amend these dissatisfactions;
- How incentives within occupant firms fortify entrepreneurial spin-offs and the impacts those have on the more widespread financial system;
- Identification of the monetary determinants of growth, at the levels of the endeavour, the district and the economy all in all (Granovetter 1985; Eme 2014; Jauhari 2007).

All of the above continue to buttress the significant effect and influence of the economy on entrepreneurship and vice versa.

2.13 The Variable Technology

Technology is the bane of present economic development. Hence, it performs an essential function in the type of opportunities that emerge and the sense of perception that creates it. Because of the dynamic nature of technology, an entrepreneur with variable knowledge of technology application and utilization recognizes and perceives opportunity gap in the system differently according to (Morten, 1993). Evidence abound in the fact that, even large companies today are either pure technology or based heavily on technology; Microsoft, Google, Apple, Amazon etc.
2.13.1 Technology

Pr(TEEmergence) is a Bayesian function of 
Pr(TE|Research, Initiative, Innovation and Invention) ... ... exp5

A measure of the technological composition of modern entrepreneurial emergence is posited in this thesis as a probabilistic prediction given the forecasted values of research capability, initiative capacity, innovative drive and inventive knack.

The word technology originated in the Greek téchné, which means a condition of ability to create with a genuine logos, (Auyang, n.d.). By logos, Aristotle generally means reason and discourse. Technology is the unequivocal interpretation of thinking innate in down to earth craftsmanship; the methodical reflection of essentials; the verbalization, speculation, refinement, and advancement of information included in profitable and imaginative exercises (Auyang, n.d.).

Technology is the guideline, procedures, and classifications of the most obvious expressions, especially those which include the use of science (Bigelow, 1829). It uncovers the dynamic connection of man to nature, the immediate procedure of the generation of his life, and along these lines, it likewise reveals the procedure of the creation of the social relations of his life, and of the mental originations that spill out of those relations (Marx, 1867).

Advances in technology through innovations and sometimes inventions have caused the meaning of technology to shift particularly in the nineteenth century, technology as a word acquired a scientific content, and became synonymous with applied science. Hence as said earlier, technology is the experimental ability to deliver and make. This capacity, as far as a society is concerned comes in four areas: intellectual assets, human resources, social capital and physical assets. Intellectual capital refers to practical know-how, hypothesis, licenses, computations, science. Human capital comprises of comprehensiveness, abilities, and practices of researchers, architects, and different specialists. Physical capital implies machines and their working standards, plant designs, bases. While the social capital covers association of instructive, exploration, modern, and other social establishments. According to Anyang, these four capitals come as a consequence of technological exercises like training, examination, development, industry, and other beneficial works (Baletti 2012; Raman 2010; Kuratko and Hodgetts 1998). (MacKenzie and Wajcman, 1985) are of the opinion that technology is the unification of
physical articles or ancient rarities, the procedure of making the artefact and the importance connected with the physical articles. In the views of (Kumar et al., 1999) as is expressed in (Wahab et al., 2012), technology is made up of two principal components:

- Physical section which encompasses of items among which includes commodities, tooling, equipment, designs, methodologies, and processes;
- An informational constituent which comprises of awareness in the areas of administration, promotion, manufacturing, quality control, credibility, skilled labour and serviceable areas.

Wahab et al., (2012 in citing (Dunning, 1981) put forth that, technology is viewed as the organization's intangible resources which shape the premise of a firm's competitiveness and will for the most part discharge under uncommon condition. As is found in their work, technology is basically knowledge or technique and is also doing things. This is on the grounds that technology is constantly associated with acquiring certain outcome, determining certain issues, finishing certain undertakings utilizing specific abilities, utilizing learning and exploiting resources. The idea of technology does not just identify with the innovation that typifies in the product however it is additionally connected with the knowledge or data of its utilization, application and the procedure in adding to the product (Lan and Young 1996; Lovell 1998; Bozeman 2000; Wahab et. al. 2012). However, (Afriyie, 1988) presents a slightly different perspective of what technology means by conceiving it as comprising:

i. the central information sub-system;
ii. the technical support system (software);
iii. the capital-embodied technology (hardware).

I have adopted (Wahab’s, 2012) chronological presentation of various definitions of Technology from preceding Literatures.

- (Merrill, 1968) explains technology as the down to earth expressions, assemblages of aptitudes, information and methods for making, utilizing, and doing helpful things.
- (Strassman, 1968) sees technology as the devices, a stock heap of utensils, however to a sort of hardware utilizing conduct, an arrangement of techniques for making particular merchandise.
- (Jones, 1970) presents the meaning of technology as the path in which the assets inputs are changed over into products.
- (Hawthome, 1971) defines technology as the utilization of science to take care of very much characterized issues.
- (Galbraith, 1972) presents the definition of technology as the orderly utilization of learning to achieve practical tasks.
- (Teese, 1976) conceives of technology as a set of learning or experience identified with the creation of a commodity or the execution of a procedure.
- (Hawkins and Gladwin, 1981) define technology as the particular information relating to the creation of the products and administrations in organised monetary action, including the learning and abilities required to deal with an arrangement of interrelated specialized procedures.
- To (Pacey, 1983), Technology is the utilization of experimental and other technical learning to pragmatic undertakings by requested frameworks that include individuals and associations, living things, and machines.
- (Woolgar, 1987) offers a definition for technology as an incorporation procedure of physical articles, the procedure of making the articles and the importance connected with the physical articles. These components are not particular and detachable variables, but rather shape a consistent web that constitutes technology.
- In the perspective of (Goulet, 1989), technology is the use of science on account of their extraordinary relationship.
- Methe sees technology as a procedure where its starting points and destination are associated and its dynamic nature is highlighted as contained in (Methe, 1991).
- According to (OECD 1992), technology is a structure or a system because of different criticism circles in the middle of it and other sub-frameworks inside of a society and to its clearly non-direct growth projections.
- As displayed by (Natarajan and Tan, 1992), technology is the information or aptitude that is required in the creation or gathering of a given decent. It in this way exemplified in the related apparatus and used by a firm.
- (Levin, 1996), technology is not by any means a thing; it is better described as a methodology. It is the use of investigative standards to take care of common sense issues. It has been portrayed as having three aspects: material relics (things), the utilization of ancient rarities to seek after an objective, and the information to utilize these antiques.
- (Burgelman et al., 1996) describe technology as the hypothetical and handy learning, abilities, and relics that can be utilized to create items and administrations and also their generation and conveyance frameworks. It is
encapsulated in individuals, materials, subjective and physical procedures, offices, machines, and instruments.

- According to (Lovell, 1998), Technologies are isolated into product advancements connected with the physical and designing parts of hardware and procedure advances that are connected with the procedures by which issues are fathomed.

- For (Tihanyi and Roath, 2002), technology incorporates data, for example, a patent, ability or competitive advantages. Alternately it can be adjusted as gear, segment gatherings/parts or as a final product. Creation strategies/forms, which require vital aptitudes to apply distinctive techniques for creation, stand for a blend of unmistakable and immaterial technology. It can likewise incorporate data that is not effortlessly reproducible or transferable.

- According to (Maskus, 2003), technology is the knowledge required to accomplish a specific creation output from a specific method for consolidating or handling choice inputs which incorporate production methods, intra-firm hierarchical structures, administration strategies, and option for finance, advertising technique or any of its blend. technology might be classified expressions, diagrams, drawings, and patent applications or uncodified in the feeling of requiring verifiable expertise with respect to faculty.

- (Reisman, 2006), technology is the improvement and utilization of instruments, machines, materials and procedures that offer assistance in taking care of human issues.

- (Greenhalgh and Rogers, 2010) advances that technology incorporates the present arrangement of production strategies used to outline, make, bundle, and convey merchandise and administrations in the economy. Subsequently, it is the use of chosen learning abilities into the production process.

Therefore, if one is given to technology know-how, there resides the capacity to create an unknown opportunity or very easily recognise a rather veiled possibility through the lens of technological tools and concepts abundant in our modern world.

These factors having been extracted individually and in some cases as a pair in the prevailing literature today, the conceptual model is developed to simulate the individual and joint effectuation to bring about an information or idea called opportunity that emerges. It can be seen from the various definitions offered in the extant literature that, technology breeds innovation which directly or indirectly produces the invention. These outcomes certainly stem from researching into prevailing entrepreneurial conditions
utilizing appropriate initiatives from the entrepreneur. For this reason, the technology variable is explored through its source in the context of this research which includes: innovation, initiative, invention and research. These four elements shall be further described in the subsequent sections and illustrate how they will be incorporated into the probability expression for prediction of opportunistic outcomes.

2.13.2 Innovation

Innovation is the process of introducing improvements to something built up through something new that increases the value for clients and adds to the knowledge store of the business entity (O'Sullivan, 2008). O'Sullivan extends the definition further to signify the procedure of rolling out improvements, huge and little, radical and incremental, to products, procedures, and administrations that result in the presentation of something new for the association that increases the value of clients and adds to the knowledge store of the association. Advancement includes the following:

(a) The advancement of another item/commodity or huge change of a current item;
(b) The usage of another or fundamentally enhanced creation or dissemination technique, and/or;
(c) The application of another hierarchical technique, including critical changes in inside and outside administration edge as found in Organization for Economic Cooperation and Development 2005 and referred to in (da Costa and Porto, 2012).

Innovation can be characterized as the utilization of new thoughts to the products, procedures, or different parts of the exercises of a firm that prompt expanded quality. This worth/quality added is characterized broadly to incorporate higher quality included for the firm furthermore advantages to customers or different firms (Greenhalgh and Rogers, 2010).

Fruitful innovation as per Livingstone is the procedure whereby new thoughts are changed, through monetary action, into a feasible quality making, value creation result. Innovation is not only the thought, it is just accomplished when the thought has been moved into a result which has worth (Livingstone, 2000).

Entrepreneurship is about innovation and the application of innovation. Usually, the application of innovation boosts entrepreneurial activity. Hence, as O'Sullivan rightly states, innovation is the foundation on which entrepreneurial activities are founded or put
up due to the competitive advantage innovation provides. And so applying innovation is the use of common sense apparatuses and procedures that roll out improvements, extensive and little, to products, procedures, and administrations that outcomes in the presentation of something new for the company that increases the value for the clients and also adds to the information store of the organisation (O’Sullivan, 2008). Nevertheless, it must be added that entrepreneurial activity in this case entrepreneurial start-ups is just one of the many avenues innovation or an innovative act or process can be brought to the marketplace. Other ways of bringing innovation to the marketplace according to (O’Sullivan, 2008) include exploitations through established organizations as well as through strategic alliances between organizations. Types of innovation as mentioned by (O’Sullivan, 2008) are product innovation which refers to act and process of making valuable changes to physical products. It means introducing a new product (physically manufactured commodities, intangible services, or a blend of both), or making a remarkably evident change in a product that already exists (Greenhalgh and Rogers, 2010). This beneficial change(s) to products can come according to Wheelwright and Clark cited (in O’Sullivan, 2008): in various degrees like. Some of them are increasing developments, additions to the product line, next-generation products, and new core products.

Process innovation is the act or process of making useful changes to the procedures that create product or services. In this case, innovation takes place in the processes that make or produce products. It means introducing fresh ways in making and delivering goods and services (Greenhalgh and Rogers, 2010). Process innovation is defined in (O’Sullivan, 2008) as the presentation of another or fundamentally enhanced strategy for the creation or conveyance of yield that increases the value of the association. The process here signifies procedures of the interrelated arrangement of exercises intended to change inputs into a predetermined yield for the client. It additionally alludes to a solid accentuation on how work is done inside of an association as opposed to what an association does. Processes identify with every single operational activity by which value is offered to the end client, for example, the obtaining of crude materials, assembling, logistics, and after-sales services.

Service innovation is the act or process of creating positive and advantageous changes to services used by customers. This type of innovation basically involves services that distribute products and makes intangible products available. Service innovation is
about rolling out improvements to items that cannot be touched or seen (i.e., immaterial items). Services are frequently connected with work, play, and diversion. Samples of this kind of administration in corporate account management, amusement, medical centres, government, diversion, retail locations, and schooling. Administration, as is found in the literature, can signify as a succession of covering worth making exercises. It can likewise be seen as execution, where customer and supplier co-produce value. Qualities of administrations are; immaterialness, client contact, inhomogeneity, and perishable creation (O’Sullivan, 2008).

As is mentioned in (O’Sullivan, 2008), there are three types of services operations:

- Quasi-manufacturing. Examples include storehouses, testing laboratory, and recycling.
- Mixed services. Examples include banks, insurance, and realtors.
- Pure services. Examples include hospitals, schools, retail, to mention but a few.

(O’Sullivan, 2008) further states that services can obviously include materials that shape a developed part of the life cycle of products, from introductory deals to end-of-life recycling. It is very common to find in most economies if not in all, service industries who deal with food, finance, education, transportation, health as well as government. It is needful to emphasize that all three types of innovation have one major thing in common, and that is to add value. The value here broadly means the addition of higher value to a firm or other firms, and to customers in terms of benefits.

Innovation happens at the time of conveying to the business arena new products and procedures emerging from utilizations of both existing and new information. It happens at the part of a mind-boggling process, preceded by inventions and succeeded by the across the board selection of the new class of items by clients, or the reception of best-practice forms in the dominant part of firms (Greenhalgh and Rogers, 2010).

To unearth the relationship between innovation and entrepreneurship, it will suffice to quote Drucker, who states that business people innovate. Innovation is the particular instrument of business. It is a process that supplies resources with the ability to make riches. Innovation, surely, makes an asset. There is no such thing as an asset until man finds a utilization for something in nature and along these lines enriches it with monetary worth (Drucker, 1985). He in advance expresses that not just is innovation the particular apparatus of enterprise, it is the methods by which they maximize change as an opportunity for various businesses or alternate services. Drucker (1985) by opportunity, he means the opening to do things differently and better.

The following are the seven sources of innovative opportunity listed by (Drucker, 1985);
1. The unexpected (which can be a success, failure, or outside events).
2. Incongruity (between reality, and what is assumed or ‘ought to be’).
3. Innovation based on process need
4. Changes in industry or market structure (such as is capable of taking people unawares)
5. Demographics (alterations in the size, age, composition, level of education, employment status or the income of a population)
6. Changes in perception mood and meaning
7. New knowledge (both scientific and non-scientific)

These seven sources of innovative opportunity can be grouped into two groups, those that take place as changes within an enterprise, business, public service, industry or service sector, which make them noticeable basically to people within that particular industry. Drucker referred to them as symptoms, but symptoms potent enough to point to changes that have taken place already, or likely to be made to take place with little effort. To this group belong the first four source areas of innovative opportunity. While the rest three source areas are those that occur as changes outside the enterprise, firm or industry.

**Principles of innovation**

Regarding the principles of innovation, (Drucker, 1985) mentions three groups of principles: The Do’s, The Don’ts and The Conditions.

**A. The Do’s**

By the Do’s, he implies things that have to be done. Under this group come the following principles of innovation.

1. Purposeful, systematic innovation starts with the examination of the opportunities. It starts with thoroughly considering what the researcher has called the wellsprings of imaginative opportunities. In various ranges, diverse inventive wellsprings of chances will have distinctive significance at various times.
2. Innovation is both conceptual and perceptual (requiring people to look, to ask and listen for opportunities). It requires being thoughtful and perceptive.
3. Simplicity and focus is a prerequisite for effective innovation.
4. Effective innovations begin small and not big or extravagant.
5. Successful innovation aims at leadership.

**B. The Don’ts**

The don’ts are things that should not be done. They are:
1. Do not try to be clever, rather, just be an ordinary human being.
2. “Don’t diversify, don’t splinter, don’t try to do too many things at once” (Drucker, 1985, p.136). Rather, as said under the do’s, be focused, stay glued to the core.
3. Don’t try to innovate for the future, rather innovate for the present (Drucker, 1985).

C. The Conditions

1. Innovation is work. It requires information. It frequently requires awesome inventiveness (Drucker, 1985).

2. To succeed, pioneers innovators must expand on their qualities. Fruitful trailblazers thoroughly review circumstances over a wide range. Be that as it may, then they solicit, Which from these opportunities fits me, fits this organization, gives something to do with what a person is good at and have indicated limit for in execution? work (Drucker, 1985). He clarifies that it is important to expand on one's qualities in advancement since development comes with risk and in addition the weighted high value on information and ability to perform.

3. Innovation is an impact in economy and society, an adjustment in the conduct of individuals by and large or it is an adjustment in a procedure that is, in how individuals work and create something (Drucker, 1985). Therefore, he expresses that innovation must at all times be close to the business sector, business centred, unquestionably customers need-driven.

2.13.3 Invention

The invention was seen by Schumpeter as one of the three stages of the creative process of economic development. The other two stages are innovation (commercialization) and imitation. The invention, instead, is just a discovery, a tool or new idea coming from a search which can also have no practical or economic implications. Inventions are always as a result of pending dilemma that has been a concern to people in a given area or even the general populace. The researcher is of the view that inventions are seen in different form and most often not in handy form. Rather than just the invention of technological tools, it can be an idea that solves a problem. It could also be a creation of a new methodology or even new thinking. The invention may be often times interpreted as creativity or innovation as can be compared to in creative art designs, cultural or societal
social behaviour innovation. For this work, any definition that creates new ideas and applies well to problem solving meets the researcher’s ideology for invention. Over the past decade, a growing segment of social entrepreneurs, small and growing businesses (SGBs) has emerged that seeks to utilize the power of invention to create products and companies that advance the lives of individuals living in poverty around the planet. This class of entrepreneur looking to develop and disseminate tangible products that will be manufactured and sold at high volumes via market mechanisms and invention-based entrepreneur (Pan, 2014).

2.13.4 Initiative

Because building an enterprise is a complex process, the initiative concept modulates the complexity that surrounds the start-up. The initiative brings to bear the initial idea which undergoes critical and constructive analysis and testing. Then, if an entrepreneurial idea is that idea that seeks to satisfy a need felt by a sufficient number of people through product or services provisioning, an aspiring entrepreneur will have to develop a good idea through careful analysis of the environment which should have the following feature: innovativeness, attractiveness, feasibility and profitability (Anon, 2010).
Chapter 3: Entrepreneurship and Complexity

3.1 Complexity Modelling of Entrepreneurship

This chapter shall be focusing on the application of simulation and modelling to study entrepreneurship. In this research, entrepreneurship is conceived as a social and complex system in which hitherto no research tool has sufficiently come up with a reliable methodology that appropriately explain the concept. In order to further clarify the
murkiness, I have adopted simulation as a better method of studying this social behaviour called entrepreneurship.

Complexity nature is not the issue. Events have basically gone past effectual complicatedness into tumult and disarray. The world has not spun out of control; our own reasoning has. We have neglected to comprehend certain connections (Vanpaemel, 2009). Scholars have implemented oversimplified answers for complex issues. In addition, they have kept up hierarchical plans and data streams that cannot deal with the multifaceted nature of our new world (Chwif et al., 2000). Sticking to the deficient models of the past, we have lost our capacity to make the importance of our social, financial and corporate universes (Michael, 2011). To work successfully with the issues that we have made for ourselves, we require a scholarly shift, and also frameworks of backing that will uproot perplexity and take complex issues back to a scale that we can understand. Our activities must change disarray to successful complex nature, instead of keep on growing it outside our ability to understand (Michael 2011; Lichtenstein 2000).

Simulation and mathematical modelling as a tool for study and prediction have recently received a lot of acceptance especially after the prediction of the ninth planet by (Batygin and Brown, 2016) through mathematical modelling and computer simulations although they have not observed the object directly yet. Bearing this in mind, could one predict entrepreneurial opportunity emergence? Achieving this shall be the aim of the rest of the sections and chapters in this research project.

3.1.1 Entrepreneurship science

This study is driven by a long-standing interest in the most suitable methods of testing and approving diverse scale models of entrepreneurial development by means of opportunity recognition (Epstein, 1999). These sorts of the model have more often than not been portrayed by their wide-ranging character. However, since their initial development over advancement more than quite a long while back, there has been a lethargic but relentless rise in their complexity. This has been hurried by a massive change in the connection of science and innovation to learning and the way science can be utilized in the public arena (Shane, 2000b). In numerous faculties, our increasing requirement for more complex models and the expanding challenges in their acceptance reflects the long-term shift from a sure to an uncertain world (Schneider and Somers, 2006). The initial 50 years of the most recent century, maybe even the past 200 years, was ruled by the idea that science would yield replies of the least complex kind to an extensive variety of pertinent issues yet this conviction has bit by bit broken down (Gilbert, 2004). The explanations behind this are various. At one level, this might be
close to one of those inconceivable mental movements in our familiarity with the points of confinement as far as anyone is concerned which happen occasionally; at another level, it might be because of an expanding assemblage of experiential learning of utilizing science as a part of the journey for precise responses to essential issues (Epstein 1999; Gilbert et al. 2005; Taylor and Robinson, 2006) and the developing acknowledgment that such conviction is deceptive. The late history of social prediction in such manner has been profitable; both full scale and smaller scale occasions, from expectations of money markets and the general execution of the economy to more nearby issues, for example, demographic change and activity developments in urban areas appear to be outside our ability to grasp and in addition control in that superfluous occasions now appear to command their conduct. In spite of the fact that this might dependably have been the situation, the models that were designed an era or all the more back now appear to be completely insufficient (Kneebone et al. 2007; Hartmann 1996; Kheir 1996).

None of this has overwhelmed scholars' interest in utilizing science to clarify and forecast but it has transformed it (Ruhe, 2007). Fifty years back, the journey to develop valuable hypotheses and models was overwhelmed by the perspective that people could simplify and extract the substance of things with the goal that we may obtain enough of the social reality adequate for cognizance and decision making (Gilbert et al., 2005). In spite of acknowledgment that the world was mind boggling, it seemed sufficiently basic to deliver some absolutism to the hypothesis and models that may be utilized in applications. With this development in risk or uncertainty and the expanding observation that the frameworks that entrepreneurs manage are inherently mind boggling, simplicity no more appears the watchword in the advancement of methods and models. The expectation is framed in capability, and our science has turned out to be less orientated to forecast however more a guide to comprehension and to structured discussions. This is clearly and unmistakably seen in the aspiration to develop 'what if' scenarios in situations which now drive every single model framework or economies (Gilbert et al., 2006).

3.2 Entrepreneurship System Model

The systems approach advocates three fundamental key values of model-ventures. The foremost includes describing the system (framework) in its more extensive environment in a manner that the framework has a fresh limit with the outside world; to put it plainly, relationships of interest must be much denser inside of the framework than outside. The
second has turned out to be more disputable and this spins around the thought that the system must show some harmony, that procedures of progress inside of it should suggest some balance and if such procedures are very much carried on, that the balance itself may be the center of the forecast. The third rule includes the components of the system that should be uniform or homogeneous in some sense, with the emphasis on clarifying the request and consistency that such homogeneity infers (Eze et al. 2012; Mitleton-kelly 2003; Sonnessa 2004; Pincus 1991).

These standards did once have all the earmarks of being implementable for entrepreneurial frameworks however it is currently simple to contend that none of these apply to even the simplest system of want to strategy or policy makers. The system of any premium are difficult to close, their standard state is a long way from-harmony; regularly no such balance ever exists they are made out of heterogeneous specialists and objects; without a doubt, their exceptional usefulness originates from such heterogeneity. The journey of science, it is currently contended, ought to be to fight with clarification and structures that endeavour to contain, if not clarify, such assorted qualities (Schwandt et al., 2008). None of this looks good for models in which customary forecast is the objective.

Complexity postulate has continuously overpowered system theory, some would say advanced it, yet few are sufficiently strong to characterize its extension in (Gell-Mann's, 1994) opinion. Most pundits, actually, describe unpredictability verifiable through its different properties and measurements, and this is the way I will take after here. The absolute best approach to describe a mind-boggling framework is by the states or conditions it can tackle. On the off chance that there are 'N' components depicting a specific state and every state is portrayed by the (paired) presence or generally of a specific condition for every component, then there are \(2^N\) particular states. For instance, there is an entire class of entrepreneurial models worked around cell automata where the condition of the framework may be portrayed by N cells with every cell being produced or not created (Epstein 1999; Sonnessa 2004). In a system with say about ten thousand (10000) cells or zones, then ascertaining the quantities of conceivable states gets to be infeasible. Add to this diverse ways or standards of producing these states, and afterward, the issue starts to scale in a way that cannot be taken care of by ordinary estimating of normal circumstances and end results connections. Obviously, none of this is new and this sort of portrayal of unpredictability has been known for quite a while. However, the
adjustment in world perspective has exchanged consideration far from the most prohibitive parts of such models to their presence properties, with the outcome that the systems we manage seem to have recalcitrant multifaceted nature.

Most would concur that unpredictable systems have breadth in their components or articles that make any altered depiction deficient. It is generally accepted that intricate systems are difficult to study by dividing the system into individual modules and examining the units (McMaster n.d.; Manson 2001; Okoye 2015; Hartford 1994). This instantly deciphers into the way that every single conceivable type of the system cannot be acknowledged practically speaking, and their representation is once in a while stable. To put it plainly, complex frameworks produce a dynamic which empowers their components to change in ways that are shockingly erratic, through adjustment, change, and so on (Epstein, 1999). This is once in a while depicted as far as a system empowering the outline of new structures. In any occasion, the sign of this sort of complexity is curiosity and amazement which cannot be or might have next to no shot of being foreseen through any earlier portrayal (Wright and Marlow 2011; Løwe et al. 2013). In any case, it can be demonstrated that such frameworks have the potential for producing new practices (Masson, 2001). (Holland, 1995), for instance, portrays complex (versatile) frameworks as being systems that keep up their structure and lucidity under every comprehensible change, in short through adjustment. (Khalidi, 2001) and (Barton, 1994) go much further to describe complexity in regards to the wellsprings of startling change or 'unconventionality'. He says: The easiest meaning of a mind-boggling framework is one that can react in more than one path to its surroundings. The decision accordingly emerges from the way that dynamic procedures inside of the framework can possibly intensify minuscule heterogeneity covered up inside of it. This suggests disturbance which Barton contends and classifies as the cause of that exhausted term emergence, which he portrayed as another method for depicting behaviours that cannot be foreseen.

From this somewhat casual presentation, I can recognize two key components that characterize our perspective of multifaceted nature and complex systems models. The first is system scope along any spatial, worldly or topical measurement. Such frameworks cannot be simplified in a regular manner in parts or combined, for in doing so, the meaningfulness of their structure would be lost. This, obviously, is specifically counter to the standard methodology in science, which includes refining the quintessence of a marvel, the substance being explained in connection to some reason, and thus utilizing that embodiment as the premise for estimating and modelling.
The second issue includes process. This can frequently be depicted as the system's progress in space and time in which sudden change happens, things emerge, and existing articles change. There are some coherent troubles in the greater part of this, for once something has emerged and once one has considered as far as possible to a framework and its conceivable limits, to gain any ground regarding fresh and clear representations, then the framework must be limited in space and time (Epstein, 1999). A lot of complexity theory so far has, actually, been worried about showing models of systems that were at first considered illogical on the grounds that they exhibited astounding conduct. Once comprehended, this conduct is no more amazing, yet constantly it must be clarified by procedures that exist at a smaller scale level offering ascend to wonders at a full-scale level which, thusly, cannot be clarified in customary large-scale terms. To put it plainly, a lot of complexity theory and its modelling are established in clarifying characteristics that have as of now been seen to some degree and which in some sense, can in this manner be seen as no more perplexing.

3.3 Entrepreneurial Complexity

This explanation consequently will concentrate on how I may demonstrate complexity even with viable interminable assortment; or rather not about how to model it essentially, and where it cannot plausibly be demonstrated expressly but to look at it as far as customary thoughts taking into account the acceptance of some structure against a very much characterized representation encoded in information. This presupposes regardless of the possibility that a system is boundlessly perplexing, some improvement must occur. What exact degree and all the more essentially, how would I manage to realize that our models will dependably be deficient in a prescient sense? Scientists continue in creating models that are naturally unpredictable however which we endeavour to accept some reality which we speak to as characteristically straightforward. This study seeks to give a few answers or if nothing else an understanding into this difficulty and perhaps to distinguish procedures for managing it, which will perpetually widen the connection (Vanpaemel n.d.; Siddiqa and Niazi 2013; Naim 1996).

I start by investigating the conventional part of validation in modelling, in going up against models with information, and with duplicating the customary part of the analysis in a social connection (Anon n.d.; Brenda et al. 2009). I will then talk about the issue of system meaning of jumping the system from its more extensive environment in time and
space. This issue has been casual in different routes as I have learnt more about models and modelling and this has made an interpretation of itself into thoughts regarding simulation. Simulation varies from modelling in that simulations are dynamic and open-ended. I will continue in this route to the simulation which contains the substance of what (Epstein, 1999) calls 'generative modelling', and I will talk about how this style of displaying has come to supplant more conventional closefisted methodologies (Robinson and Taylor, 2004). It is in this setting that changes in the accentuation given to the part of the acceptance of a customary kind can be legitimized.

Complexity theory has dominated current discussions in the domain of sciences, economics or geography, in trying to explain or throw more light on the emergent trends of events in our constantly evolving world. While the promoters of complexity modelling may see this as a method for rearranging apparently complex frameworks, the genuine routine of complexity theory is definitely not straightforward in that there is no identifiable complicated hypothesis however rather, various speculations related to complex systems all under complexity research.

In order to properly comprehend complexity theory, (Manson, 2001) suggests a tripartite overview of complexity theory which are; Firstly, Algorithmic complexity which takes the semblance of arithmetical complexity or information theory and views complexity as the difficulties faced in describing complex systems characteristics mathematically. Secondly, Deterministic complexity this evaluates complexity in the form of chaos and catastrophe theory which cogitate that, the interactions of a couple of main variables may produce stable large systems however prone to discontinuities. And, thirdly aggregate complexity focuses on how individual elements of a system work in collaboration to create systems with complex behaviours.

While these categorizations enlighten us about kinds of complexities, it becomes even more complex to find out that some systems have all three kinds of complexities operating within it. Still they all rely on regular non-linear computational settings of mathematics and simulations to understand from the non-reductionist perspective the constituent parts nature and behaviours within the entire systems.

Complexity theory is a conceptual creation derived from general system theories in the opinion of (Von, 1972) as with the philosophy of organisms, cellular automata, neural networks, and cybernetics. Complexity research differs from previous and similar research in that, it concerns complicated connections between dynamic entities, unlike the system theories which deals with static entities linked by linear relationships and
assumes systems to exist in equilibrium. It also employs artificial intelligence technique to evaluate qualitative characteristics and concerns how behaviours emerge or evolve from simple local interactions between changing systems components over time (Grossberg 1988; Kaushik and Singhal 2009; Duman et al. 2008).

In a very similar way, networks and their complexities have undergone metamorphic study with the result that the term complex networks has become common terminology amongst researchers in biological networks, the internet, and social networks. Researchers in these fields try to understand this term through reviews of its concepts of clustering, correlations, randomness, models and dynamic processes (Boyer et al. 2004; Piccardi 2013). Recent research has seen the focus shift from the analysis of single small network with its properties to large scale networks involving interconnected vertices numbering in the billions.

![Figure 3.1: A typical network of 12 entrepreneur's activities by interaction and inter-networking, (Piccardi, 2013).](image)

A close look at the Figure above demonstrates the conceptual inter and intra-actions that occur within entrepreneurs and their network community. It is this behaviour that lacks adequate reporting in the extant entrepreneurial literature. It should be understood that each entrepreneur according to the Figure 3.1 above has varying inherent abilities as depicted which collectively informs the response of an entrepreneur to opportunities or their capacity to see an opportunity or to create one. Because the sub-variables inter-
depend and influence one another, and each entrepreneur tends to have some influence on another colleague, the entire system appears like a web and hence I consider this as complex. Therefore, the best approach to studying complex systems was concurred in this study to be by modelling and simulation.

### 3.4 Complex System Environment

Every complex system owes its existence to relationships with its environment. Where the environment represents anything or influence outside the system (Manson, 2001). Figure 3.1 aims to demonstrate the complex interaction and inter-networking that exists between the attributes that combine in undefined ways to result in the behaviours seen in personalities called entrepreneurs. Although only a few of these attributes has been selected in this research to be studied using emergent and complex ideology. Similar to neural networks, While any specific outcome in this emergent philosophy has a small probability of being realised, the researcher has conjectured that the observation of consistency in the final outcome will suggest that a trend or pattern could be discerned over a series of entrepreneurial experiments.

Human society can be arguably a very complex and intriguing system that can be evaluated using logical strategies. Its structure of intellectual beings with unrestrained choice and psyche, there appears to be no restriction to the ways in which it can conform or redesign itself (Epstein, 1999). The world over, Many situations reveals an arrangement of tight systems of the individual tie and social connection through which convictions are engendered, trust is manufactured, society is shaped and intelligence is shared. In the nucleus of the network and trickling down through all levels are embedded decision makers who propagate the system norms in neither regular nor random technique but by a system driven by geographical propinquity, shared history, cultural and religious affiliation, common economic interest and much more.

A repetitive inquiry in the investigation of interpersonal organizations (social network) is the manner by which they help a general public to process data that permits them to respond and adjust to a changing situation and economies. Understanding this versatile learning procedure is of extraordinary monetary significance as it can help a legislature to arrange a solution for a shrinking economy. Albeit monetary prediction is not a definite science; it remains a vital choice making a device for organizations and government as they define money related methodologies and policies. It is a process of making predictions about the economy which involve a high level of aggregation of economic
elements like, inflation, fiscal deficit, GDP, unemployment etc (Anon n.d.; Anon n.d.). I assume that, because entrepreneurship could be a palliative measure that can help the government better the economic situation, this research rationale becomes very crucial and beneficial to the researcher’s proposed usefulness in government policy formulation. Be that as it may, as promising as this sort of academic enquiry may be, it breaks with conventional monetary assumptions and requires another kind of financial modelling, hence the Bayesian model of entrepreneurship here proposed.

It is true that the dynamic behaviour of intricate psychosomatic systems is often difficult for non-psychologist to comprehend how, for example, can a person have more than one separate and dissimilar characteristic (Barton, 1994)? Dynamics here implies how the resultant consequence of a variety of forces action on the behaviour of any system over time and the approach in which these systems search for best possible steady states. From a mathematical point, dynamics can be classified as being linear or nonlinear. But most natural systems fail to be described with linear system algorithms/equations (Morrison, 1991); this could be due to observing a sudden jump in system behaviour as a result of a continuous change in control parameters. Most frequently, the solution entails an outline of results (Barton, 1994) therefore, to discover such patterns, a nonlinear and dynamic expression embedded in Bayesian estimation and explored in NetLogo simulator is here presented.

3.5 Technology Entrepreneurship Model

Technology Entrepreneurship is the collective investigation and creation of new products, resources, and their kinds, which are complicately identified with advances in exploratory and innovative information and the company's advantage proprietorship rights (Bailetti, 2012). Technology enterprise could be seen as running little organizations owned by scientists or researchers, discovering solutions or applications for a specific innovation, dispatching new pursuits, presenting new applications or maximising opportunities that depend on exploratory and mechanical information and working with others to deliver innovation change (Bailetti et al., 2012). Technology business can be an interest in an undertaking that collects and sends specific people and heterogeneous resources that are unpredictable identified with advances in experimental and mechanical learning with the end goal of making and acquiring values for a firm. The product of scientific and technological changes which compel innovations to new products and ideas is also considered as a technology entrepreneurship. This research defines Technology entrepreneurship as a business concept inspired by the growth of knowledge-based
service economy and driven by advances in technological innovations and corporate competition (Bailetti, 2012). Entrepreneurship whether IT driven or not can be considered the fourth factor of production which plays an important role of proportionately combining the other factors profitably and effectively to create wealth and growth. This will be modelled by using the technology elements of Initiative, innovation, invention and research.

This work demonstrates that (Lichtenstein, 2011) was correct when he defined entrepreneurship to be the study of emergence. This emergence, therefore, results from, the aggregation and intersections of new ideas, new technologies, new networks, new ventures, organisations, initiatives, and industries. Complexity science consist of orderliness creation consequently is a superior stage for a study of business enterprise. Since cutting edge epistemology still calls for model-focused science, agents’ models are proposed as a different option for arithmetic as a method for applying advanced ordinary science measures to look into on enterprise (Lichtenstein 2011; Manson 2001; Baranger 2001). Complexity is the investigation of the flow of the various linkages and associations among individuals, innovation, and frameworks after some time. This dynamic methodology conceptualizes hierarchical frameworks sets of agents or people, procedures, and systems that produce novel emergent results out of the connection of the specialists (McKelvey, 2004).

3.5.1 Entrepreneurship

Business enterprise is pre-prominently an attitude. It is the craft of discovering innovative beneficial answers for issues. Each effective business person, each fruitful specialist has been somebody who has possessed the capacity to recognize an issue and concoct an answer for it before another person did and bring a solution to market before the competition. Permit this research project to be referred to as an entrepreneurship project as it seeks to proffer solution(s) to perceived research problem that needs attention and refocusing (Lazear 2014; Davidsson and Wiklund 2001; Bailetti 2012). By attention and refocusing here it means, individual entrepreneurial skills should not be viewed as static but dynamic, assessment on human ability should not be based on some fixed attributes as previous research have done. The current research falls under the general classification of entrepreneurship seeing to present solutions. It suggests that individual entrepreneurial skills are better viewed as dynamic rather than static. Much previous research has considered these skills as being based on fixed attributes.
As a consequence, this project models the behaviour of the entrepreneur as the individuals gain knowledge through social interactions, environmental changes, technological discoveries and development of personal skills and abilities.

### 3.5.2 Who Is an Entrepreneur?

French economist, Jean-Baptiste Say (1767-1832) described a business visionary (Entrepreneur) as somebody who shift monetary assets from a zone of lower to a region of higher efficiency and more noteworthy yield as in (Drucker, 1995).

Notwithstanding, a business visionary can be compared to a man who periodically makes and develops to manufacture something of perceived quality around a noticed opportunities.

In this definitions,
- Entrepreneur – can be an individual business person, additionally an entrepreneurial group or even entrepreneurial association.
- An individual – stresses an identity as opposed to a framework
- Habitually – just cannot quit being a business person
- Creates – begins starting with no outside help and brings into being something that was not there beforehand
- Innovates – ready to overcome hindrances that would stop a great many people; transforms issues and dangers into circumstances;
- conveys – sees thoughts through to conclusive application
- Builds something – depicts the yield of the creation and development process
- Of perceived quality – envelopes financial, business, social, or tasteful worth
- Perceived opportunities – recognizing the chance to maximise a thought that could possibly be unique to the business person; seeing something other people miss or just find out at a later time.

In their view of defining entrepreneurship, (Lowe and Marriott, 2006) suggested that restricting the entrepreneurial concept within businesses would be rather a very narrow way to approach the subject matter. Therefore, they conjecture that people can be enterprising in how they live their lives and thereby create and pursue more opportunities for themselves and perhaps get even more enjoyment out of life. They also went ahead to
acknowledge that not all enterprising people are successful even though success has a varying yardstick for the measure.
To some, success means financial gains, to some also, may mean self-esteem or social standing. And to many others, it could mean artistic excellence or more time with family and loved ones. In whichever case, whatever the motive every entrepreneurial involvement inevitably includes risk taking and wherever there is a risk, there could also be a failure (Menon 2002; Shirley 2013). Failure in this research is a positive perspective of entrepreneurship as it avails the individual another opportunity to learn hence will guide them to do things differently at next attempt or trial.

Not everybody is a characteristic business visionary. Numerous individuals are cheerful to maintain the status of a secured employee over the dangers of beginning their own business. That is good since business people need workers. It is somewhat interesting however in light of the fact that incomprehensibly, the employee who picks the fanciful security of a vocation is really betting on the accomplishment of the business person's business as much as the business visionary is betting on the business achievement. Is it accurate to say that you are a business person? Might you want to be? There are sure character qualities that best business visionaries illustrate. A cautious examination of an individual's identity, on account of these qualities, will let us know whether the individual has or need to create what it takes to be a fruitful and prosperous business visionary (Lynn 1969; Moreno 2008; Agbim 2014).

1. Drive to succeed: An intense drive to make an achievement, acquire riches, legacy or popularity is the essential helper for generally business visionaries. They are seriously enthusiastic about what they do, just about to the point of devotion. Their objectives are set high and when accomplished, are reset considerably higher. Cash is not typically looked for its own purpose, but rather as a method for keeping track of who's winning.

2. Adaptability to evolving circumstances: Rather than opposing or hating change, business visionaries can without much of a stretch adjust to changing circumstances and conditions. Truth be told, numerous business people blossom with change. On the negative side, some are so excited by the change that they will constrain it, notwithstanding when things are going consummately.

3. Need for self-sufficiency: Some individuals simply should work for themselves. While numerous representatives see work as giving security, business people see
a vocation as a type of monetary subjection and want to have individual self-sufficiency to financial security. The most exceedingly terrible part about working for one’s self is that the desires for your occupation capacity are set higher than for others. The best part about working for yourself is that in the event that you do not care for your requests, you can transform them at whatever time you desire.

4. Decisiveness: The capacity to decide, now and again rapidly, is a key part of the entrepreneurial identity. This ability to make, and hold to, a choice is a vital initiative expertise. The mindfulness that there might be better choices at any decision point does not bring about the hesitation that other individuals regularly illustrate.

5. Personal fate: Most business people have more than only a powerful urge to shape their own fate; they have a solid confidence in their capacity to make their own fate by their own particular decisions and activities. On the off chance that they are among the few who put trust in a set destiny or foreordained predetermination, they trust that they are destined or bound to be effective.

6. Energy: Entrepreneurs are vigorous. They put in more work hours than a great many people. They additionally regularly play hard and intensely. You will not discover numerous entrepreneurial weaklings. They are typically excessively bustling working or playing, making it impossible to be spectators. This high individual vitality level deciphers as consistent energy and individual mystique. This excitement and allure propel other individuals into the course of action of the business visionary.

7. Enterprise: Entrepreneurs are dealmakers. They enter an agreement with themselves. (When I achieve a specific objective, I will remunerate myself with so, so and so). They make bargains in their own connections. (A motion picture date is as much an agreement as a business arrangement.) And, they want to make business bargains. They appear to be continually arranging something with some individual.

8. Personal advancement: Entrepreneurs are learners and self-improvers. They are vigilant for approaches to get the focused edge, to wind up better at doing what they do, to grow new sets of understanding. They comprehend that what you
have relies on what you do and what you can do relies on who you are. They work continually to wind up additional.

9. Intuition: Most business people depend more on hunches to settle on choices than they do on cognizant examination of a circumstance. Despite the fact that they might be profoundly scientific and like to aggregate bunches of information, their genuine choices are typically in light of what feels right. A late review of top level administrators and organization proprietors reported that most high wage chiefs assemble however many data as could be expected and counsel with their mastermind group, yet at last, settle on choices in light of hunches or instinct.

10. Opportunity searching: Most individuals sit tight for the right chance to present itself. The genuine business person is dependent and watchful for yet another new business opening. It is regularly simply an issue of viewpoint. There is the popular story (for the most part credited to Joseph Bata) about the shoe organization that sends a worker to a nation in Africa to find out if there is a business opportunity for their shoes. The delegate reports back, there is no shoe market here. These individuals do not wear shoes. The entrepreneurial administrator, on listening to this news, shouts, this is awesome. Nobody has any shoes yet. What an enormous business opportunity!

11. Perseverance and determination: This is a significance property. The snags that cause numerous individuals to stop are minor misfortunes for the genuine business visionary. Champions persevere. Losers quit. It is regularly that basic identity contrast that isolates the happy effective individual from the disappointed failures. There is no better approach to express the significance of determination than Calvin Coolidge (1872-1933) who is cited in (Laura Moncur's motivational citations; www.qoutationspage.com), Nothing on the planet can assume the position of perseverance. Ability will not; nothing is more basic than unsuccessful men with ability. Expertise will not; unrewarded expertise is very nearly a saying. Instruction will not; the world is loaded with educated weaklings. Constancy and determination alone are transcendent.

12. Problem fathoming: When others concentrate on existing issues, business people concentrate on conceivable resolutions. There is dependably an answer. There is dependably an issue. For the vast majority, an issue is an obstacle. For
the business visionary, an issue is a chance to find or make a superior discovery or finding.

13. Risk tolerant: The business person has a high resistance for danger. The normal individual fears to accomplish something on the off chance that they fizzle. The genuine business visionary realizes that neglecting to endeavour in something is a bigger disappointment than attempting and not succeeding. Truth be told, they regularly do not understand that they are going for broke. What others might judge as a hazardous circumstance, business visionaries see as an opportunity for a higher prize.

14. Self-certainty: Many individuals will take a gander at an effective individual and see a major personality and imagine that this whiz has a major sense of self since they are fruitful. Truth be told, best individuals have an abnormal state of self-regard before they make progress. They know in their souls that they merit achievement. The absence of adequate self-regard and fearlessness is the thing that represses numerous individuals in their journey for achievement. Business people (and many victors) are certain about their capacity to accomplish their standards.

3.5.3 What Are Entrepreneurs Like?

Kuratko (2005) attest that enterprise is not the minor making of business. Regardless of the fact that it is surely a significant piece of it, yet it is not an end in itself. Subsequently, he expresses; the attitude of looking for opportunities, embracing uncertainty beyond precautions and possessing the obstinacy to drive an idea through to actuality sums up into an extraordinary standpoint that invade business visionaries (Renolds et al., 2004). It is this opinion that makes and changes a person into a business visionary. It can be created in individuals and can be shown inside or outside a relationship, in advantage or non-advantage endeavours and in business or non-business practices with the finished objective of conveying imaginative ideologies. These imaginative thoughts are seen to be inventive in nature subsequently, altering how business is directed at each level in every society.

The Shifting business environment recommends that expansive scale firms are
synonymous with an administration which tends to repress development. Accordingly, the business environment is moving inventively to suit the necessities of its quickly changing business sector players. Advancement and business enterprise are starting to prosper the world over and can be relied upon to make much smaller scale, yet bolder organizations (Thomas et al., 2006). Knowing and taking into account this is the way entrepreneurial endeavours beat larger companies. Dov et al. (2010) found in their study that business visionaries in high Novelty and high Technological vulnerability enterprises had advanced education, they adore difficulties, and they are more dedicated, entrepreneurial, visionaries, imaginative, daring people, instinctive, investigative, and aspiring than those in low Novelty and low Technological unstable organisations (Edward, 2005). While the latter favours short term venture creation and success, the former reflected potentials for building the future (long term ventures). These, therefore, suggests that business visionaries are more pulled into ventures that fit their identity and the way they deal with the new pursuits is influenced by their identity attributes.

According to Drucker, for the recent decades, a mass migration of individuals moved west for a decent education and regularly wound up staying in light of the rich opportunities that existed. Be that as it may, now, these business opportunities are not restricted toward the West. Opportunities are worldwide in degree, and individuals are coming back to their country to use their recently procured ability and to grow fortunes with it, and hoist worldwide competition. The interest for development on a universal scale and for the enterprise that goes with it will concentrate progressively on being more reason driven (Drucker, 1985).

3.6 The Model: Of Entrepreneurial Opportunity Recognition Process

Understanding where business people ought to search for opportunities remains an imperative issue. The prevalent press concentrates on final outcomes, for example, the MP3 players (e.g., i-pod) or cellular telephones (e., i-phone), (Jeffrey, 2008). The monetary ways to deal with Opportunity Recognition (OR) expect that conditions happen in the economy that offers ascent to new opportunities (Shane, 2000). These conditions are the after-effect of, for instance, demographic changes, socio-political patterns, and changes in government regulations. At the point when such changes happen, they produce disequilibrium in the economy. That is, in the most straightforward economy, there is awkwardness in between products and services available to be purchased or
supplied and the longing buyers to acquire that same merchandise and services (Qing et al., 2008).

Another way to deal with comprehending opportunity recognition (OR) includes seeing it as a multi-level and frequently complex procedure. In this way, the procedure point of view has turned out to be a more productive territory of examination since it recognizes that OR is a multifaceted occurrence affected by various components that might be basic to the final result (Robert et al., 2006). Despite the fact that procedural ways to deal with OR are generally viewed as promising, notwithstanding, the many-sided quality of the OR process has elevated the test of exploration and made it harder to reach important inferences. Yet a few important endeavours to model the OR process have risen amid the most recent quarter of century ago (Qing et al., 2008).

On this basis, this research has formulated a conceptual model that adequately captures the multi-faceted influences and integrates all to generate a more robust and intelligent but complex output which can enable us to draw meaningful conclusions in understanding opportunity recognition or creation as the case may be (Min-Seok, 2008).

Scholars have theorized that people might vary in the way they effectively prepare data, representing resulting contrasts in entrepreneurial exercises (Gaglio et al. 1992; Kaish et al. 1991). Taking this line of thinking, late hypothetical models in (Ardichvili et al. 2003; Lumpkin et al. 2001) have further proposed that distinctions in these dynamic psychological procedures may likewise on a very basic level record for contrasts in consequently focused execution. While these contentions keep up sensible face legitimacy, it is essential to acknowledge that complementary examination has censured preparatory examinations on different procedural basis. Maybe all the more significantly, this additional examination has additionally neglected to reproduce past discoveries in the wake of redressing for the constraints outlined (Busenitz, 1996).

In an attempt to deal with the subject of why business visionaries might as a matter of fact process data uniquely in contrast to non-business visionaries, analysts have started to address the likelihood that business people keep up various inspirations that influence their choice to utilize opportunities. For instance, past scholarly evaluations has demonstrated that components, for example, opportunity cost (Amit et al., 1995), social bindings to tycoons (Aldrich and Zimmer, 1986), and professional know-how (Cooper et al., 1989) influence a person’s ability to seek after opportunities. (Chen et al., 1998) have
likewise discovered proof proposing that trust in one's enterprising capacities (i.e., as far as uncertainty and business extension) is decidedly identified with picking an entrepreneurial vocation. The ensuing study has expanded this past examination, discovering that business creators who are surer about their entrepreneurial abilities accomplish essentially more prominent new pursuit development (Baum and Locke, 2004).

While this preparatory confirmation bolsters the expansive thought that business people might as a matter of fact be differentially propelled to utilize opportunities for the monetary venture, it stays uncertain for three reasons. In the first place, the earlier motivational examination has not sufficiently controlled for former and optional clarifications, which has jumbled our capacity to translate the genuine influences of such impacts (Shane et al., 2003b). Second, it stays hazy how diverse sorts of opportunities influence the way of this relationship (Shane et al., 2003a). Finally, past hypothesis and exact exploration has not thought about how possible it is that motivational impacts might change in their significance relying upon which aspect of the entrepreneurial procedure is viewed (Shane et al., 2003b).

This survey of the enterprise propensity (opportunity) exploits scholarly articles to bring to fore that learning stocks and subjective instruments are likewise essential to yielding a comprehension of how opportunities are harnessed, and also in anticipating the resulting level of progress (Baron and Ensley 2006; Mathew and Scott 2010). Again it additionally exhibits this little yet developing collection of exploration has yet to give a plentiful comprehension of this wonder for no less than two reasons.

To begin with, methodological issues have again highlighted broadly the advancement of the comparative essentialness and particular part of individual intellectual systems in the opportunity acknowledgment procedure. Secondly, by assuming that the subjective procedures business people utilize are a one of a kind, yet durable, bound in nature, past examination has neglected to look at the likelihood that such motivational procedures may contrast as an element of the sort of chance that is perceived (Okoye 2015; Okoye 2014).

3.7 Defining Entrepreneurial Opportunities

In order to successfully explore what entrepreneurial opportunities are, one must avoid the infinite regressive slope of endlessly trying to explain the origin of the origin of the
events and factors that may be considered contributory and influential to the emergence of opportunity within any defined system.

The association of business visionary and opportunity is the quintessence of enterprise. While no particular hypothesis clarifies it, one ought to realize that opportunity is the potential condition of wealth creation, and is acknowledged through an emergent procedure (Lowe and Marriott 2006; Shepherd and Krueger 2002). Emergence here implies that business people associate with other financial operators who have assets to make new wealth where the enterprise is the imaginative procedure since business people ought to produce new innovative solutions, goods, and services. Innovation is the questionable excursion with potential outcomes of numerous disappointments along the way of acknowledgment in the demonstration of new business creation (Min-Seok et al., 2008).

For a large portion of a century now, taking after the issues raised by market analysts, for example, (Hayek, 1948), (Schumpeter, 1934), (Kirzner, 1997) and (Arrow, 2012), specialists have contemplated the financial matters of innovative change and the issue of allotment of asset for development (i.e. the creation of data/learning). The greater part of business enterprise writings expect that new specialized data will either be exchanged as a merchandise or get to be epitomized in products and services (called financial products), without tending to a particular instruments or procedures for the change of new data into new monetary substances. It is inside of this gap people get a handle on the idea of entrepreneurial opportunities and its source as an emergent idea. An entrepreneurial opportunity comprises of an arrangement of thoughts, convictions and activities that empower the production of future merchandise and services without present market for it (Venkataraman, 1997).

An entrepreneurial possibility exists where there is a need, challenges or issues that can be resolved, unraveled or fulfilled by receiving an imaginative system. This imaginative procedure is posterity of an entrepreneurial thought; which is a particular better approach to fulfilling a need, conquer an issue or solve a puzzling dilemma (Hitt et al., 2011). But how does an entrepreneur generate this idea? The answer is by employing a variety of resources (The entrepreneur’s Personality, Prior Knowledge, Social Network, Environment and IT knowledge) to incubate potential opportunities and process information generated through the application of disposable resources.

While prior research has added enormously as far as anyone is concerned about
opportunity cognition (or opportunity acknowledgment process), they have not, when all is said and done, tended to one principal inquiry: What is the fundamental way of this procedure? At the end of the day, how does opportunity acknowledgment really happen in the brains of particular persons (Dailey et al. 1996; Thomas 2004)? In the event that it is accepted that the acknowledgment of new business opportunities does without a doubt include psychological occasions and procedures experienced by people, then one conceivable system for tending to this inquiry includes applying the speculations and strategies for intellectual science to this errand (Baron and Ensley, 2006).

A part of speculations of pattern recognition with vital ramifications for comprehension opportunity acknowledgment is the proposal that psychological systems, created through people's unique experiences, assume a critical part in pattern cognition (Hans et al., 2012). Speculations of pattern cognition propose that these subjective systems serve as formats (examples or aides), helping particular persons to perceive associations between clearly free occasions and drifts and to identify important examples in these associations (Baron and Ensley, 2006). This part of example acknowledgment hypotheses proposes an interesting clarification for the way that specific business opportunities are perceived by particular persons however not by others.

Quickly, the persons who perceive particular opportunity might do as such in light of the fact that they have pertinent psychological systems that offer them some assistance with accomplishing this assignment. Structures that empower them to see the new examples that underlie numerous unexplored business possibilities (Baron and Ensley 2006; Shane 2000b; Edelman and Yli-Renko 2010; Bird et al. 2012).

The topic of whether opportunities exist in the outer world or are made by human personalities is one that has been bantered in the field of business enterprise for quite a long while (Dunning et al., 2003). The position that was taken by (Baron and Ensley, 2006) is that there is, actually, no crucial disagreement between these perspectives. Potential opportunity appear as a consequence of modifications in information symmetry, innovation, markets, and an extensive variety of political and collective circumstances; be that as it may, they persist only a possibility until they materialize in particular individuals personalities as the aftereffect of dynamic subjective procedures (Shane 2000b; Dunning et al. 2003; Bird et al. 2012).
3.8 Austrian Economics as the Theoretical Foundation

Vanghely and Julien (2010) utilized a contextual analysis of ten SMEs and connected a design of individuals’ data management which gives a casing to comprehend the business visionary's utilization of data to distinguish opportunities. This model incorporates an algorithmic or example sort of data handling and a heuristic or experimentation kind of data preparing into a commonsense casing of the business person's chance acknowledgment development component. They went ahead to show how human data processing can direct entrepreneurial opportunity recognition (Bird et al., 2012).

Two surges of thought identified with business cognition and human data management can be seen in the academic articles. They are the opportunity identification or creation perspective by (Shane, 2000b) and the opportunity development or order point of view by (Vaghely and Julien, 2010). The first view has its foundation in psychological brain research and the subsequent in social constructionist or formative brain research. This research on complex simulation of opportunity emergence anchors and benefits so much in understanding the human information processing (Boyer et al., 2004). The ability of individuals (entrepreneurs) to discover or create an idea (opportunity) is completely dependent on how they process information which is also effectuated by how much certain qualities or special abilities they have or learnt and or experienced (Spilling, 1996).

The cognitivist perception of data handling depends on a pattern-like or algorithmic model. Data guides the business visionary's presentation of reality normatively; business visionaries analyze their representations of nature in order to shape the logic or rationale of their system. Data is explicit, can be coded and in this way formal. Connecting patterns of data from different sources frames the premise of advancement and new business opportunities (Brady and Haugh n.d.; Pi et al. 2008; Bandura 2002).

The constructionist point of view depends on an experimentation or heuristic model. Business people use data in an analytical manner; they build their existence by utilizing data from their surroundings. With a specific end goal to share data, make new learning and advancement and build opportunities, the business person must legitimize the convictions that depend on that data (Ruhe, 2007). Offering structure to such data is the way to the development of new business opportunities (Vaghely and Julien, 2010). The
point of view thinks about a model which can give a structure to comprehending the business person's utilization of data to distinguish open doors as portrayed by (Marvel and Droege, 2010). This exploration and numerous others suggest that the business person's data preparing is a mixed blend of algorithmic and heuristic data management; this structures the basis for its reception of complex recreation with a Bayesian derivation model (Cunningham and Lischeron, 1991). In the translation, development and order of their surroundings, business visionaries and their association utilize an experimentation sort of data handling for sense-production and opportunity development; this they consolidate with examples of data in view of their know-how to distinguish opportunities. This model coordinates the constructionist (or experimentation kind of) data processing and cognitivist (or pattern sort of) data handling viewpoints into this down to earth frame of the business visionary's data handling and opportunity cognition development components. Business people as data processors utilize pretty much both methodologies with a specific end goal to distinguish opportunities; in this way entrepreneurial open doors can be perceived and developed in the meantime in an assortment of blends and perceived or built separately.

3.9 Entrepreneurial Opportunity as an Emergent Complex System

Various elements are liable to impact a man's choice to participate in entrepreneurial engagements and in this manner endure in endeavours to begin a new business, these entrepreneurial procedure and exercises are consistently affected by political, social and monetary components (Minniti, 2005).

The idea being investigated in the rest of this chapter is that business visionaries vary from a specialist in that they have a comparative disadvantage in a solitary expertise yet have more adjusted gifts that traverse various diverse abilities. Experts can work for other people who have the ability to spot and consolidate an assortment of aptitude; however a business person must have that ability. In spite of the fact that business people can contract business people; the real business people must be adequately knowledgeable in an assortment of fields to judge the nature of candidates (Lazear, 2005).

A business person must have the capacity to consolidate abilities and deal with those of others. Why do some get to be business visionaries, and what qualities make effective ones? The majority of the past work on business enterprise has been exact, however, it is
valuable to have a hypothesis to manage the empirics and to help with the translation of the outcomes. It is enticing to contend that the most gifted individuals get to be business visionaries since they have what is required to take part in the innovative action. While surely this appears to be sensible, a few perceptions appear to negate it. The individual who opens up a little dry-cleaning shop with two workers may be termed a business person though the half-million-dollar-per-year official whose suit he cleans is another person's employee. It is improbable that the shop proprietor is more capable than the regular official (Okoye, 2015).

For sure, the converse may be valid. As need is the mother of innovation, maybe business people are made when a labourer has no choices.

Instead of originating from the highest point of the capacity appropriation, they are what is left over. Again nonetheless, opposing perceptions are not hard to discover. Any capacity measure that arranges John D. Rockefeller, Andrew Carnegie, or, all the more as of late, Bill Gates close to the base of the circulation should be addressed (Lazear, 2005). While people will be slanted to have some expertise in one or the other ability, since they might have a solid supreme point of preference in one ability, Entrepreneurs are a knowledgeable bunch, which implies that they should be moderately great (or generally terrible) at everything.

A re-translation of Knight Frank's perspective on Risk, Uncertainty and Profit by (Richard and Metin, 1993) recognized three sorts of instabilities about the future that financial specialists might confront:

- The first comprise of an outlook whose dispersion subsists and is recognized, and along these lines, choices would just include computing the chances of a specific draw and put down one's bets in view of the investigation. For this situation danger can be diminished through enhancement.

- The second comprises of a prospect in which dispersion subsists, however, is not well-known ahead of time. The specialists for this situation needs to appraise the distribution through rehashed trails and can regard it the same as the primary case. Be that as it may, as the earth changes powerfully, fruitful systems advance through versatile procedures including cautious experimentation and learning after some time. Despite the fact that we do not have the foggiest idea about the
probabilities appended to every resulting situations, the likelihood does exist, and their dissemination can be revealed after some time.

- The third kind of vulnerability, which he named as genuine instability, comprises of an expectation that is obscure, as well as mysterious with non categorise-able cases and a imaginary dispersion.

A definitive rationale or brain science of these consultations is complex, a part of the logically incredible puzzle of life and psyche. We should essentially fall back on a limit in the smart creature to frame or make right decisions about possessions, a natural feeling of qualities. We are built to the point that what appear to us sensible is liable to be affirmed by experience or we could not live on the planet by any means.

Taking after Sarasvathy's grounded conceptualization of effectuation; the essential concern is not which of the three perspectives are correct, but instead which perspective is more helpful in every particular state of vulnerability (Sarasvathy, 2001). This down to business approach permits us to recast Knight's perspectives as a geometrical type of entrepreneurial opportunity in light of the pre-conditions for their presence as below:

- Opportunity Recognition  
The opportunity for uniting them must be perceived. Also, this then executes the conjunction in the middle of demand and supply.

- Opportunity Discovery  
On the off chance that one and only side (Demand or Supply) is self-evident, then the non-existing side must be found before the conjunction can be executed (Shane, 2000a).

- Opportunity Creation  
On the off chance that neither interest nor supply exists in an undeniable way, then no less than one or both of them must be created and a few monetary innovations in advertising, financing must be made for the opportunity to emerge.

Research into the art of simplicity and complexity nature will normally incorporate testing out the importance of the basic and the complex, yet should likewise consider the likenesses and the distinctions among complex versatile frameworks, working in such differing forms as the beginning of existence on Earth, organic development, the conduct
of life forms in environmental frameworks, the operation of the mammalian immune-
framework, learning and thinking in animals (inclusive of people), the advancement of
human social orders, the conduct of speculators in budgetary markets, and the utilization
of personal computers programming and equipment intended to advance systems or to
make forecasts in light of past objective facts in the analogy of Murray Gell-Mann’s
(2013) public lecture presentation the quark story.

Enterprise as a vocation alternative has turned out to be progressively alluring, and there
is a genuine need to build up an opportunity situated entrepreneurial outlook among
undergraduate, graduate and postgraduate students and business inclined people. Current
enterprise tuitions vigorously depend on the direct procedure of business planning and
infrequently empowers the mind boggling thinking styles essential for entrepreneurial
professions emergence as implied by (Sardeshmukh and Smith-nelson, 2010). Such non-
linear thinking is at the heart of this study.

Enterprise is frequently connected with the making of new organizations, yet its
extension amplifies well past that solitary action. Indeed, the quest for opportunities,
uncertainties and showing perseverance constitute an entrepreneurial viewpoint that
might be displayed on an extensive variety of hierarchical structures and entrepreneurial
exercises (Kuratko, 2005).

Opportunities develop as a consequence of individual endeavours to maximise the
irregularities produced through various sorts of changes in the outer environment (Baron
and Ensley, 2006). They have recommended that the spotting of such opportunities can
be credited to an individual’s capacity to perceive patterns crosswise over assorted sets of
data (Baron and Ensley, 2006). Consequently, they recommend a methodology that urges
students to accomplish more than simply assess business thoughts, (for example, the
activity of a plausibility examination or the composition of a strategy for success) in
anticipation of maximizing opportunities.

Inventiveness is seen to be connected with exercises, for example, expansive thinking,
design cognition, recombination, ideation, and ordering. These activities might encourage
the creation of the significant intellectual aptitudes and capacities to make one of a kind
blend(s). The ability to recognize shifts and changes (which produce opportunity gap) in
the marketplaces is vital to every aspiring entrepreneur (Sardeshmukh and Smith-nelson,
2010).
Therefore this study opined that, it is important to note that a great deal of what the entrepreneurs do is the production of tacitly observable knowledge, and such knowledge is mainly acquired through the experiential activities like working in an organization or company and for students an internship programme which can help in the development of intuitive abilities for opportunity discerning and exposes them to decision making heuristics used by entrepreneurs.

3.10 Alertness as a Foundation for Opportunity Recognition

No opportunity is maximised nor does any enterprise come to exist, survive, or develop without business visionaries making a move. Aphoristic may be, however little has been comprehended about what constitute those activities or practices of business visionaries and if business visionaries' conduct is recognizable (Bird et al., 2012).

Since these behaviours take after to a great extent the psychological procedures of opportunity identification, one would expect that the business enterprise studies gives plentiful proof of how business people act while making new pursuits, yet rather critical weaknesses flourish (Baron and Ensley, 2006).

The scholastic enthusiasm for business visionaries' conduct concentrates on the utilization of a business opening and the creation, advancement, and early development of another endeavour. The emphasis is on the tangible, hypothetically perceptible activities of people (as solo business people or as a component of a group of business visionaries) in the start-up or early phases of venture creation normally the initial 6–7 years (Kaish and Benjamin, 1991). These practices are the proximal result of attributes, learning, aptitude, capacities, insight (e.g., discernments, considerations, mental models, and scripts), inspiration, and feeling (Bird et al., 2012). It is critically important not to confuse performance with entrepreneurial behaviour because performance stems from a complex aggregation of several behaviours and as such cannot be seen as separate but rather a product of aggregate and constructive behaviour stirred to a specific end. Entrepreneurial emergence can be said to be a product of an entrepreneurial action which results from the intrinsic behaviour of an entrepreneur. It should be very clear that it is the behaviour that produces actions and the actions inadvertently yield performance which becomes tangibly obvious to any observer.
Were theoretical and methodological meticulous study of the behaviour of entrepreneurs during utilization of business prospect, an organization of assets, organization emergence (Lichtenstein, 2000), and early venture development to occur, then perhaps resultant knowledge will allow extrapolation to other populations. Then, and only then, is behaviour ‘entrepreneurial’ instead of the behaviour of entrepreneurs (Bird et al., 2012). While the behaviours of entrepreneurs are personal qualities (personality traits) which may vary significantly amongst entrepreneurs, entrepreneurial behaviour is a characteristic manifestation of those qualities through actions that constitute opportunity creation or discovery or perhaps emergence (Dvir et al., 2010).

3.11 Kerznerian Theory

It is recommended that the acknowledgment of novel business opportunities regularly consist of pattern assimilation as the intellectual procedure in which individuals identify important structure in intricate mixture of events or patterns implies (Shruti and Ronda, 2011). Fundamental research on pattern observation shows that intellectual systems obtained by means of know-how (e.g., models) presume the main component of this procedure. Such structure gives individuals with a reason to seeing a relationship between evidently free events or occurrences (e.g., advancements in development, shifts in business areas, changes in government courses of action, et cetera.). As well as distinguishing important occurrences in the organisations. It is proposed here that ideas for novel goods and services recurrently grow out of the appearance of such pattern and occurrences infer (Baron and Ensley, 2006). New business opportunities are distinguished when business people, utilizing important intellectual systems, draw an undeniable conclusion with respect to clearly arbitrary events or designs and after that distinguish patterns in these affiliations suggestive of novel commodities or administrations (Baron and Ensley, 2006).

3.12 Opportunity Recognition Review

Whether it is to make an Internet web crawler, an automobile or another eatery, an imperative part of being a business person is distinguishing an opportunity for another business, making opportunity cognition an essential part of the enterprise process (Nicos et al., 2009).
Finding entrepreneurial openings requires that people have some type of prior information, as well as have the subjective capacities that permit them to esteem and utilize that information aver (Matthew and Scott, 2010). Essentially, chances to add to a product not-yet-in-presence and along these lines making an endeavour are a complex exercise. Current hypothetical and exact work in business enterprise recommend that the investigation of intellectual instruments and their associations with an individual's current learning base are vital pieces in the puzzle of opportunity maximization (Andrew, 2007).

Recognizing and choosing the accurate opportunity for innovative organizations are amongst the largely critical capacities of an effective business visionary. Hence, clarifying the disclosure and improvement of chances is a key some portion of business enterprise research (Alexandra et al., 2003). Various models of chance utilization and advancement have been introduced as of late. While these endeavours have contributed incredibly to our comprehension of chance recognition, they miss the mark concerning offering a far-reaching comprehension of the procedure for two noteworthy reasons. In the first place, each of these viewpoints principally focuses on stand-out of the different parts of the procedure. For instance, (Sigrist, 1999) takes a gander at the psychological procedures included in opportunity acknowledgment; (De Koning, 1999) and (Hills et al., 1997) referred to the informal community connection; while (Shane, 1999) concentrates on the prior information and experience vital for effective acknowledgment. In any case, this attention on particular elements comes from the top to bottom investigation of individual components to the detriment of other just as imperative causalities in the same study. There is likewise no harmony among business enterprise specialists on significant ideas used to describe and operationalize the procedures being referred to.

### 3.13 Cognition

For three hundred years, the areas of economics, statistics, and probability theory has dominated the decision sciences and the likes of Bernoulli, Laplace, Von Neumann, Savage and others, developing normative or rational models of decision making. A weakness of this approach, however, is that it disregards the cognitive capabilities of the agent and only considers the environment in which behaviour takes place (Linda and Helena, 2010). In contrast, intellectual (cognitive) researchers have frequently neglected
to perceive that the procedures they are attempting to model occur in an unstable environment including genuine outcomes. In this manner, the perception of this present reality needs to face choice making (Ruhe, 2007).

Psychologists of the subjective school of thoughts describe instinct in the perspective of knowledge. They describe knowledge as visualizing and comprehending the internal character of things, particularly by instinct. They characterize instinct as the quick perception of something devoid of the cognizant utilization of thinking. Having knowledge is having a scope of data or facts while thinking will be applying logic sensibly and scientifically (Mahmet, 2012). Knowledge is normally said to happen when a person is presented with a number of new knowledge that yields newer ways of taking a look at a known issue or challenge in a manner that its fundamental components are quite understood.

Knowledge is a piece of an amplified mental procedure. It depends on a past time of cognizant arrangement, requires a time of hatching amid which data is handled simultaneously at a subliminal level, and is trailed by a time of cognizant assessment and explanation.

Numerous specialists all through the world have turned their thoughtfulness regarding the investigation of business visionaries and enterprise, originating from various hypothetical viewpoints and distinctive fundamental methodologies and utilizing diverse approaches. The outcome has been an affirmation of the way that business enterprise activity is an extremely intricate and heterogeneous occurrence (Cunningham and Lischeron, 1991).

It is undoubtedly true that business enterprise has numerous aspects. One aspect of entrepreneurial conduct has been depicted by individual qualities or worth (Dvir et al., 2010) while (Baron and Ensley, 2006) grapples on perceiving opportunities as a key property. Yet another recommends that the accomplishment of business visionary may be enhanced by specialized and non-specialized administrative aptitudes and another further perceives the need to alter the course of a business.

Each of these models above depends on specific presumptions about the conduct of a business person given an arrangement of past occasions, discernments, qualities or individual standards and attributes and gives distinctive sorts of bits of knowledge (Cunningham and Lischeron, 1991). Various components are prone to impact an individual's choice to participate in the entrepreneurial action and in this manner continue.
in an activity to begin another business. These entrepreneurial procedure and exercises are consistently affected by political, social and monetary variables as opined by (Reynolds et al., 2004). This is why I employ Bayesian technique to enable the unitary aggregation of behaviour and cognitive processes to ascertain the measure of entrepreneurial emergence or occurrence.

The next chapter continues the review on entrepreneurship as a study rooted in complexity and possessing emergent properties. Would it be possible to categorically say entrepreneurship is linear or flat? The researcher, in the next chapter, will demonstrate through the literature the strong indication that entrepreneurship is a complex system and therefore should be studied using the tools and theories of complexity science.
Chapter 4: Entrepreneurship as Complex Behaviour

Why Agent Based Rather Than System Dynamics Modelling.

"System dynamics (SD), which is related to the work of Forrester (1961), grounds modelling on difference equations and impinges upon the assumption that the behaviour of individuals that are embedded within a social system can be explained by the feedback nature of causal relationships that characterises the structure of the system.

Agent-Based models (ABM), on the other hand, simulate actions and interactions of autonomous individual entities and build on the hypothesis that the behaviour of social systems can be modelled and understood as evolving out of interacting but autonomous learning agents (Epstein and Axtell 1996; Axelrod 1997; Axtell 1999). Thus, a crucial feature of agent-based models is the emergence of ordered structures independently of top-down planning.

While Agent-Based models show how the interaction among individual decision-making and learning may generate complex aggregate behaviour, the SD approach aims at reducing emerging aggregate, and often puzzling, behaviours into underlying feedback causal structures. As a consequence, SD models typically aggregate agents into a relatively small number of states assuming their perfect mixing and homogeneity (Rahmandad and Sterman 2008). On the other hand, ABM preserves heterogeneity and individual attributes at the risk of relinquishing robustness and parsimony. It is a modelling technique that employs autonomous agents that interact with each other. The agents’ behaviour is described by rules that determines how they learn, interact with each other and adapt. The overall system behaviour is given by the agents’ individual dynamics as well as their interactions.

When is it better to use agent-based (AB) models, and when should system-dynamics (SD) models be used? Whereas SD models assume homogeneity and perfect mixing within compartments, AB models can capture heterogeneity across individuals and in the network of interactions among them. AB models relax aggregation assumptions, but entail computational and cognitive costs that may limit sensitivity analysis and model scope.
### Table 4.2: Main difference between SDS and ABS adopted from Mallona (2008).

<table>
<thead>
<tr>
<th>Features</th>
<th>SDS</th>
<th>ABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perspective</td>
<td>Top-down</td>
<td>Bottom-up</td>
</tr>
<tr>
<td>Building block</td>
<td>Feedback loop</td>
<td>Agents</td>
</tr>
<tr>
<td>Unit of analysis</td>
<td>System structure</td>
<td>Agent’s rules</td>
</tr>
<tr>
<td>Level of modelling</td>
<td>Aggregate</td>
<td>Individual</td>
</tr>
<tr>
<td>System structure</td>
<td>Fixed</td>
<td>Not fixed</td>
</tr>
<tr>
<td>Time handling</td>
<td>Continuous</td>
<td>Discrete</td>
</tr>
</tbody>
</table>

While SDS may be widely applicable at higher levels of abstractions, ABS is a paradigm that finds application at any level of abstraction, including those levels considered in SDS. Since it is possible that many simulation problems can be solved by both system approaches, it is important to make choice of what approach to adopt for any given problem. This research work has chosen ABS because, it is best suitable for explicit representation of individuals in space and time and bases its outcome on the behaviour that emerges from the interaction of the individuals and their environments. Although this will require computational power and produces large set of data for analysis, its stochastic nature and its discrete pattern means, it is best suited for our biological universe of interaction (Scholl et al., 2001; Grimm et al., 2005).

#### 4.1 Entrepreneurial Organization and Complexity

In the context of this work, Complexity is regarded as a parameter which can be used as a scale of measurement. Firstly it is the measurement of elements within a system, a system is said to be even more complex when it has more elements interacting within it. For instance, the interaction between groups of a friend is less than what obtain in the larger society in which they exist. Secondly, it could be perceived as the measurement of the degree of interconnectivity within a system. Hence, complex systems are modelled as networks that can capture and quantify this information about the relationship between the elements. System thinking is the driving concept behind complexity science and the foundation on which complexity is analysed (Vanpaemel n.d.; Baranger 2001; Okoye 2015).

While I refer to entrepreneurship as a complex system, it stems from a carefully articulated structure and process which is call organization. The process of organization
is simple and orderly but the result is most often emergent and complex. Therefore, the entrepreneurial association can be characterized as an association that places novelty creation and advantage at its heart keeping in mind the end goal to deliver monetary or social quality. Be that as it may, for most associations, this is just a brief moment in their development. In fact, the characteristic cycle for most is from this entrepreneurial state, by means of development, to security, decay, and emergence and, at last, either eradication or change (Anon n.d.). Likewise, an enterprise might be seen as one kind of administrative introduction, in particular, that of driving a business organisation. The thought of engaging in business activities is by and large connected with specific mindsets for considering, world perspectives, or ideal models (Robinson, 2009).

This paradigm of system thinking grew from the limitations of the traditional linear, analytical and reductionist approach to understanding how things work. The traditional system of evaluation falls short in explaining systems and networks as it could not elucidate the emergent behaviours that show absolute variance with the system’s subsystems. This, therefore, brings a fresh perspective to understanding complexity through simple mechanisms and relationships. It is this paradigm that inspires the current research task of understanding entrepreneurial evolution or, the preferred term, emergence. The concept of entrepreneurship is embedded in the behavioural and reactionary tendencies of individuals towards their abilities as it mixes with knowledge. Because knowledge here is constantly changing, the outcome of its impact on human behaviour changes consequentially. It is in the midst of these uncertain consequences that an irreducible behaviour or incident I termed emergence occurs (Fuller et al. 2008; Kuratko 2005; Norman 2011; Schwandt et al. 2008; Vanpaemel n.d.).

Over the years, our theoretical systems have grown into large and sophisticated bodies of knowledge such as philosophy, mathematics, and many other areas. In the face of this edification, system thinking has led to another closely related area called systems theory that provides a whole suite of tools for analysing and modelling systems and their related interaction dynamics as they evolve (emerge) over time. Therefore, this concept of thinking may be considered as emerging worldview inside of numerous fields from science to engineering and business administration that displays a distinct option for the customary present day investigative techniques for enquiry by accentuating the advantages of more broad and contextualized comprehension of the world. System thinking is complex because it is the integration of many different models, some of which may be less well developed, but which nevertheless contribute to the whole (Fuller et al., 2008).
The focus of this research is not in the properties of entrepreneurship or the characteristics of an entrepreneur but on the relationships between these properties and how they interact to produce the emergent entity called the entrepreneur. It must be emphasised that in this work, the term entrepreneur indicates a concept or even a state of mind, rather than the person.

Studying entrepreneurship as a linear concept that is deterministic does accurately describe the veiled behaviours that are evident amongst entrepreneurs. While linear system modelling has proven successful in many areas, the reality is that our world and society including economies are made up of nonlinear attributes which all line up to exhibit what can be described as “emergent” characteristics. Entrepreneurial characteristics can combine synergistically to produce some behaviour greater than what is already known or may combine by interference to produce a diminished behaviour which is actually less or worst that what we already know or have (Schwandt et al. 2008; Pincus 1991).

The challenges of modern day science and governments have appeared to be nonlinear which are essentially complex and explanations are sought through complex system science. It is the relationship between these attributes that determines the outcome of the study. The characteristics of entrepreneurs can be described as adaptive attributes or behaviours that may vary or adjust as they encounter changes within their environment. This adaptive behaviour, therefore, leads us to a complex adaptive mechanism which involves several adaptive characters interacting and evolving to produce a substantially stable behaviour in an entrepreneur. Be that as it may, the interrelationships between these adaptive sub-parts or element are the crux of our investigations in this research (Okoye, 2015).

Take for instance the effect of the cultural attribute; individuals in close proximity develop a standardised mechanism for interactions and coordination through a common set of greetings, language, and rituals. Over time, these micro-interactions will develop into a formal cultural system. These emerging self-organised microstructures whether they are markets, social institutions or cities then in turn feed back to affect the actions of the individuals within the systems constraining and facilitating their future actions. Given this emergence of the new levels of order, as the system evolve the elements’ capacity for adaptation and complex interaction within the system, it is nearly not possible to forecast precise future behaviour in the long term, an analogous situation is in weather forecasting.
and climate; we cannot tell if it is going to rain on any certain day (for instance, 23rd) of this month next year, although we can predict, with some certainty, that if conditions do not change, then the globe will on average be some 3 degrees warmer in fifty years time. A viable method for modelling how this system evolves over time is to allow the system to develop and then observe what happens. This method of simulation is called agent-based modelling where an agent has ascribed, a simple set of rules that govern its behaviour to see what microscale patterns evolves from its interactions.

Self-organisation in complexity can be described as the spontaneous long-term appearance of order or global coordination out of local level interactions (Vanpaemel n.d.; Shane and Venkataraman 2000).

4.2 Emergent Patterns from the Literature

While it is true that entrepreneurs possess the ability or aptitude to spot and seize opportunities, it is becoming obvious that emergence here is in three parts; the presence of the opportunity which could be created, discovered, re-invented or adopted, the capacity to spot the opportunity and the courage to pursue the opportunity.

The aptitude to notice opportunity or an idea is an exceptional ability that cannot be overlooked in this study. This trend defines the individual, team or organization’s foresightedness for proffering solutions to nagging problems without necessarily creating something new but by re-inventing an existing solution concept to become more encompassing and reliable within the society in which it is required. (Bowers, 2007) submits that, occasionally a breakthrough solution derived from a hitherto unknown method emerges; usually thanks to works done by think tanks and universities and which entrepreneurs have spotted.

This attitude is linked to entrepreneurs being good listeners and readers while they continuously search for information. Often, there are histories of behavioural patterns with entrepreneurs even though, this cannot be generalized since some starts slowly and the system is highly influenced by environments. Experience has been found to be very crucial in their development and their flexibility especially at start-up gives this group advantage in succeeding.

The entrepreneurial trait of pursuing opportunity can be seen in their fierce drive, energy, tenacity, doggedness, and improvisation. It strongly suggests that entrepreneurs do not take time off while pursuing their goals and as a consequence of boundless optimism, both failures and setbacks merely provide another opportunity to re-invent. The emergence of opportunity, therefore, becomes an outcome of tenacious search and
objective effort towards creating or re-inventing solutions in the form of products, goods, and services.

4.3 Complexity in Defining Entrepreneurship

Does entrepreneurship have a globally accepted universal definition? Can there be a generally acceptable definition of entrepreneurship? This research is predicated on the attitude that entrepreneurship should be studied with regards to the perspectives within which the process exists.

President George Bush famously said that the French had no word for Entrepreneur. In French, the word entrepreneur means small businessman or small trader. In English, the word has an additional implication of risk-taker, originality, and flair.

However, many definitions of entrepreneurship exist in the literature, mentioning a few would help in the overall understanding of the topic of study. One of the most ancient meanings of who a business person is was that given by traditional financial analyst (Say, 1803). As he would see it, a business person is the monetary specialists who unites all method for creation, the labour force and the capital resources of one or the other and who finds in the worth of the products which comes about because of their occupation, the reconstitution of the whole capital that the use and estimations of the wages, the profits and the rent which he pays and in addition benefit accruing to himself (Nimalathasan, 2005).

Mbhele (2012, p. 95) characterizes entrepreneurship (business enterprise) which is a French word got from the verb "entreprendre", and implies to embrace, that is “entre", signifying "between", and "preneur" signifying "taker" or "a between taker" (Louis Jacques Filion, 2008, p.1) "as an act that consist of the discovery, evaluation and utilization of probabilities to showcase new commodities and services, methods for classifying, business divisions, processes and unfinished materials through arranging endeavours that beforehand did not subsist”. (Kirzner, 1997), as referred to in (Mbhele, 2012) sees the business person as a person who is aware of chances for exchange. The business person is fit for recognizing suppliers and clients and going about as a middle person where benefit emerges out of mediation. Schumpeter (1934) point of view takes to some degree diverse inclination in its presentation of business enterprise which is said to constitute advancements that outcome in new blends that pushes inventive destruction where the recently made merchandise, services or firms can hurt existing products, services or firms (Mbhele, 2012).
Drucker (1994) clarifies that a business person is somebody who dependably searches for difference, reacts to it and adventures it as an opportunity. Innovation is the particular instruments of enterprise the methods by which they maximise change as an opening for an alternate business/service (Nimalathasan, 2005). (Imhonopi and Urim, 2011) as referred to in (Halliru, 2013) explains the person of an entrepreneur as a professional, who focuses on exploiting profit opportunities by making use of price penetration strategies and developing products and organizations for the achievement of his goal. (Afolabi, 2015) goes further to mention (Adekunle and Kasumu, 2005) who put forth that an entrepreneur is a person who on sighting an opportunity, has the willingness to take risks with the aim of growing the business in question to a level or stage that contributes economic value to not just himself, but also to society.

Peter Drucker (1970) and knight (1967) both cited in (Duru 2011; Baba 2013) explains that enterprise is about embracing uncertainty; it is the procedure of making new values that did not already exist; it is the act of beginning new association, particularly new business; it includes making of new profits through usage of new ideas.

Business enterprise is evaluated in (Baba, 2013) and perceived as the procedure of making something unique other than what's expected by investing important time and exertion, and social risk and accepting the prizes of fiscal and individual fulfilment. Onuoha (2007) sets that enterprise is the act of starting new associations or reviving existing associations, especially new organizations having recognized the hitherto unseen opportunity. (Schumpeter, 1965) branded business people as individuals who maximize market opportunity through expert and hierarchical development. (Bolton and Thompson, 2000) likewise expressed in (Eroğlu, 2011) their perspective of a business visionary as an individual who regularly creates and expand aiming to manufacture something of apparent quality around seen opportunities. (Hisrich, 1990) as cited in (Eroğlu 2011) clarified that a business visionary is someone who exhibits active and imaginative mindset, can sort out social and monetary instruments to turn assets and situations to pragmatic documentation, and notifications uncertainty and failures.

Soyibo (2006) as referred to in (Duru, 2011) notice key focuses in the meaning of business visionary he presented. He plainly clarifies enterprising as the procedure of perceiving an opportunity that is associated with requirements fulfilment and changing it to a thing (item or services) of quality. He adds that enterprise likewise alludes to the
procedure and exercises attempted by business visionaries which are coordinated at catching the quality connected with business opportunities. In his perspective, the business enterprise is a procedure driven by the yearning to enhance - create new things (merchandise and services; forms or approaches) or enhance existing ones, and benefit from them. (Shane, 2003) as is referred to in (Torikka, 2011) who presents the meaning of business as an action including the exposure, evaluation, and exploitation of likelihood to formulate novel products, techniques for ordering, business divisions, processes, and crude resources, through organizing endeavours that already had not been in existence depicts enterprise as a procedure that includes seven distinct stages which are: presence of chance, disclosure of chance, choice to adventure opportunity, asset securing, entrepreneurial system, organizing procedure and execution.

4.4 Existence of Opportunity

Every day of an entrepreneur’s existence is an opportunity to create, resolve, and evolve. The choices made by them create the atmosphere of advancement so critical to the time spent in the current reality. The need to accelerate growth often weighs heavily upon the cognitive mind which is burdened with desires for self-accomplishment or pressured to survive the harsh conditions surrounding them. There are those who seem to float through the journey with ease. Entrepreneurship may not be for these as the pursuit of goals and deliberate conscious effort to be creative lives within the individual or group. An intricate pre-plan of the lifestyle guides the individual’s energy into situations for the opportunity of great growth (Nixdorff 2008; Ruhe 2007).

However, it is not enough to just plan because plans formulated can alter as life proceeds. Partnerships break-up, plans may be abandoned; nevertheless, the dominant core energy of entrepreneurial personality still moves forward with certain power to enable them to glean the expansion necessary. It is essential to note that for in the pursuit of entrepreneurship, not every encounter will be delightful. In fact, the probability of encountering frustrated, angry individuals is high. To stand the greatest chances of success, individuals have to be prepared to accept and face the potential and mental consequences of failure. While it can be all too easy to concentrate on past misfortunes, clear choices well selected and the realisation of incremental success will prove fundamental.

This research comes to the conclusion that no two entrepreneurs have the same defining characteristics; therefore trying to follow a stereotype is self-defeating. It seems that the
route to success passes through a strong focus on creation, resolution and evolution while learning from the social experience.

4.5 Opportunity Discovery

Opportunity Discovery is an ordered means by which new regions of quality can be identified. It consist of a planned course of action and strategies, instruments and methods that allow an organization to absolutely scrutinize another (or notwithstanding existing) area to ascertain potential prospects. The Opportunity Discovery process is a forerunner to undertaking numerical assessment or making a business case. It is a course of action that differentiates wants and yearnings that are the fountain of novel ideas and thoughts for innovative business advancement activities (Wollheim et al. 1959; Shane 2000a).

The opportunity disclosure procedure can be represented by considering a campaign that happened in 1804-1806. This was the Lewes and Clark Expedition, otherwise called Corps of Discovery Expedition. In this mission, the Corps of Discovery set out to examine the immense domain of the Louisiana Purchase. Their central goal was to find, delineate and order what was out there. They had almost no thought of what they would discover other than the general idea that the domain they were going to investigate was one that was rich with intriguing, huge and profitable things. Their objective was to bring back as complete and point by point a mapping as was conceivable utilizing restricted assets and inside of a restricted time span. There was no chance that they could (or ought to) do an extensive study of each square meter of the whole domain. They needed to locate the right things and do it rapidly.

The challenge confronted by Lewis and Clark is fundamentally the same to the tasks confronting numerous associations that embark on finding new opportunities. This task is to observe a substantial and new area quickly and thoroughly, and locate the unknown that can be the source of potential quality. In Lewis and Clark's case, the great stuff were regular resources, intriguing destinations, indigenous populace, and the general information about the residents of the area and other things of interest out there. For an association, the objective is the unmet goals and necessities of prospecting clientele, consumers or constituents, the source of future quality. Needs and desires drive future adoption, value and ultimately innovation. Desire is often a more powerful force than
need. Just looking at problems to solve often misses some of the most important sources of value, which should be tapping into people's desire for new experiences. But how did Lewis and Clark go about their voyage of investigation and disclosure and in what manner should an association do likewise?

The fundamental principles of the Opportunity Discovery procedure are quick and expansive, proof based, looking and using pointers, iterative developing and improvement technique. In clear Lewis and Clark terms, this involves covering a considerable measure of area quickly to distinguish possible items of interest and after that to devote extreme amount of energy and resources taking a close look at these exact items of quality on the off chance that it is worthwhile (i.e. in the event that the proof says that there is something there). For instance, scouts in Lewis and Clark's Corps of discovery would cover a lot of territories quickly and observe specific destinations that appeared to be attractive for reasons unknown. Some time would then be spent at those regions and a decision would be reached whether to proceed onward or to invest significantly more energy researching the site. In some days, the Corps would make a great deal of progress, and at distinctive days, it would cover only a little or even stay in one spot. Therefore, the Corps, and by similitude, the Opportunity Discovery Team, focuses thought on the most promising potential outcomes and contributes as much energy searching as is advocated by what they are looking for. This brief outline recommends that the disclosure procedure or component is transformative and not a positive or sure from the earliest starting point of the inquiry.

The Opportunity Discovery Process is depicted here in point of interest. This depiction is expected to be a manual for the individuals who are keen on undertaking a far-reaching, organized and powerful method for finding new opportunities in light of genuine proof of unmet needs and yearnings. The different segments of the procedure are: This procedure overcomes a considerable lot of the front-end issues and issues that organizations keep running into when searching for new business openings. The components and qualities of the procedure make it perfect for profitable and practical identification of opportunity that can be huge for a person's association. What this early stage process does not do is to let you know how to decisively address the opportunity. This procedure has demonstrated itself compelling for numerous types and sizes of associations. It is the most comprehensive, point by point; far-reaching and compelling procedure accessible for undertaking the earliest phase of deciding the eventual fate of the company (Kirzner 1997; Muegge and Teece 2012).
The Opportunity Discovery Process (ODP) discerns particular openings in areas where profits can be made. This procedure normally is attempted after an association has a reasonable thought of the technique or vital alternatives it needs to research however before they have a particular business or innovation methodology in mind. The ODP is a learning process. It creates new possibilities to learn about new opportunities by initially explaining what may be poor assumptions or inadequate thoughts and select, creating, developing them to the point that the chosen few are prepared for a ripe business opportunity harnessing. The investigation process itself is confirmation based and influenced by engagements with an outside group from which unmet needs and longings can be found.

4.6 Decision to Exploit Opportunity

Opportunity maximization is a fundamental part of the process of creation of a fruitful business in the entrepreneurial procedure, yet there has been minimal theoretical and experimental improvement of this issue in the literature. This exploration likewise quickly looks at the choices of business people to start utilizing business opportunities from an asset-based perspective. Our examination of a specimen of business people whose organizations are situated in hatcheries proposes that business visionaries will probably maximise opportunities when they acquire more knowledge of client interest for the new product, all the more fully advanced vital innovations, more prominent administrative ability, and more noteworthy partner support. Also, the discovery in this study gives more insight into a less popular part of the resource-based perspective: the new good's expected lead time goes about as an improving mediator in business people's utilization strategies. Suggestions for future examination on opportunity cognition are discussed.

4.7 Resource Acquisition

Once the opportunity has been discovered and strategy for exploration put in place or defined, it becomes time for the entrepreneur to start defining the project and estimate the resources necessary to proceed. This is when any would-be entrepreneur should discover the value of some of the traditional tools of classical Businessmen and management
science. The talented amateur will save much effort by the appropriate application of project management techniques. This process is termed Resource Acquisition.

4.8 Entrepreneurial Strategy

The strategy is a high standard resolution to accomplish one or more objectives. It may well include the need to employ several sets of skills such as logistics or critical path analysis. In governance, the concept of strategy evolved into an exhaustive technique to try to search for political interests, as well as the risk or legitimate exploitation of power, in an argument of wills in a military conflict, in which both adversaries collaborate. The technique is imperative in light of the fact that the resources within reach to achieve these objectives are generally constrained. In this manner it involves the outlining of objectives, choosing undertakings by which to realize the objectives, and activating assets to perform the activities. A good strategy should describe how the objectives or goals will be attained by the resources at the individual’s disposal. Strategy in organizations and businesses adapt to their environment or competitions. It can be subdivided into activities such as strategic planning and strategic thinking (Baden-Fuller n.d.; Hartford 1994).

**Strategic thinking** is expounded as a psychological process associated to an individual in the context of accomplishing progress in a business interest or dissimilar endeavours. As a cognitive action, it also yields thoughts which are the bricks with which the walls of the mental creativeness are erected for an outstanding or very brilliant ideology. At the point when utilized in a reliable or enterprise essential administrative process, strategic thinking consist of the creation and utilization of new commercial enterprise know-how and opportunities projected to give a better chance to an enterprise or alliance in business. It should be feasible exclusively and additionally cooperatively amongst specific persons who can utterly change an association’s prospect. Organizational strategic thinking might yield more worth by strengthening a foresighted and innovative dialogue, where folks enhance other colleagues' knowledge in fundamental and intricate issues. This is seen as an achievement in profoundly aggressive and rapid varying business landscapes.

**Strategic planning** is an organisation's methodology for describing its system or way, and making important decisions for assigning its resources to effectively perform this methodology. It might similarly extend to control systems for controlling the
implementation of the modus operandi. Strategic planning became common in enterprises amid the 1960s and remains an important element of strategic management.

4.9 Organizing Process

Organising is a precise procedure of ordering, incorporating, coordinating assignment objectives and exercises to assets, keeping in mind the end goal to accomplish targets or objectives. This process involves specialisation, division of labour and orientation towards achieving goals.

Specialization and division of labour, it appears that the whole mental logic of organization is fixed on the ideas of specialization and separation of roles. The division of labour is doling out responsibility concerning each hierarchical part to a particular person or a group thereof; it gets to be specialization when the obligation regarding a particular errand lies with an assigned master in that field (Philipsen, 1998). The endeavours of the agents are made easy to allow the current procedure to work effectively. Certain agents assume the roles of administration at diverse times in the process to ensure harmonization. But in the case of entrepreneurs, as envisaged in this study, the individual or group displays multiple abilities. It seems likely that most entrepreneurs are goal oriented hence, in organizing; there is always an inclination towards the entrepreneurial acts purposes and objectives. The grand aim is to ensure that the overall goals are harmoniously achieved across an organization or firm.

4.10 Performance

Performance is the accomplishment of a given task evaluated against specific known benchmarks of precision, accomplishment, expenditure, and speed. In an agreement, performance is perceived to be the fulfilment of an obligation, in a way that absolves the executioner from all legal responsibility under the agreement. In this study entrepreneurial performance is measured by assessing the work carried out by the entrepreneur towards the achievements of predetermined goals and could be good or bad depending on the closeness to the desired outcome.

Cole (1959) interestingly groups entrepreneurs into four groups as mentioned in (Nimalathasan, 2005). They are:

(i) the innovator (discoverer)
(ii) the calculating inventor (creator)
(iii) the over-optimistic promoter, and
(iv) the organization builder.
In his view, these different kinds of entrepreneurs are not correlated to the behaviour but to the type of opportunity the entrepreneur encounters. This view clearly contradicts with the views in (Okoye, 2014) wherein the personality of the individual or group was considered as a crucial part of the emergence process in entrepreneurship.

4.11 Socio-Cultural Theories of Entrepreneurial Emergence

Various theories and hypothesis have been utilized to clarify the effect of socio-cultural settings on enterprise development. The theories attempted to clarify the social and cultural attributes which make individuals be or not to be business people. The most punctual hypothesis was that of Max Weber, a German humanist. In his hypothesis (Die protestantische Ethik und der Geist des Kapitalismus, 1905) Weber clarified that society assumes a major part in producing business people. This is on account that, the individual draws his or her qualities from the social qualities, morals and institutional system inside of which they live infer (Ven, 1993). He contends that culture has an awesome effect on the mentality and conduct of people and their mannerism to lifestyle. Regardless of whether an individual would create and get to become an entrepreneur would rely on his manner and value inclination. Weber referred to religion particularly the protestant Calvinistic religions, as a component of society which straightforwardly impacts the conduct of people towards becoming business visionaries(entrepreneurs). Such religious attributes as diligent work, thrift and a dedicated life of abstinence are all prescription for business enterprise. He infers that the socio-cultural framework in which people live add some virtues to ordinary people’s values and style of thinking (mindset), and these subsequently impact and influence the choices being made by individuals decidedly or contrarily towards business enterprise, i.e. not considering whether to be or not to become business visionaries. Basically, social structures and the social order impact the advancement of entrepreneurial soul and motivation by exhibiting ethics that either promote or limit business enterprise progress and drive amid the populace. In the specific case of Nigeria, the literature was dominated by the view that individuals who emerge as entrepreneurs are frequently individuals of a poor background, mostly with a low level of education, but with a ‘burning’ desire for upward social mobility and recognition. Although this view might seem outdated and incorrect but it does correspond with the influence of social conditions in the making of an entrepreneur (Oghenerobaro, 2012).
4.12 Concept Supporting Theories:

4.12.1 Family orientation theory

The hypothesis suggests that elements, for example, family connections and relationships are roots for entrepreneurial qualities and the development of business people. The hypothesis accentuated the role of the family in adding to the entrepreneurial character. It is recommended that the home climate and estimations of an entrepreneurial family can give a lot of sustaining and backing for the advancement of entrepreneurial identity or character. This is so in light of the fact that the family foundation of an individual is a solid impact on qualities and character and along these lines serves as a concrete source of impact whether the person would be a business visionary or not. This thinking advances the conviction that specific qualities built up and upheld quite early in life will lead in the end to entrepreneurial emergence and accomplishment (Dedekuma, 2014). However, the legitimacy of this hypothesis is still subject to debate. This is on the grounds that in all actuality, most offspring of productive business visionaries do not themselves become entrepreneurs, let alone being successful entrepreneurs. Children hardly ever display the entrepreneurial values of their entrepreneur parents; moreover, they often do not even try to take them as business visionaries, notwithstanding when the parents attempt to make their children succeed them. Children often choose their way; which leads to the problems of progression for their parents businesses. Thus consequently among others, family organizations frequently do not remain in the control of the family after the departure of the founder.

4.12.2 Educational incubation theory

The educational incubation theory suggests that instructive improvement helps entrepreneurial development through production of mindfulness and new inclinations and information. It has been said that knowledge is power; if so, learning is the key to release that power. Hence, it is reasonable to assume that a properly educated individual or groups are more likely to carefully apply prevailing knowledge to entrepreneurial pursuit it would, therefore, seem likely that social orders with an elevated state of training tend to deliver a greater number of business people than social orders with less taught individuals. The developed nations might be referred to for cases of such social orders; this reason has been suggested for its increased emphasis in many countries (Kuratko 2005; Kuratko and Hodgetts 1998).

However as opposed to the above perspective, certain scientists have contended against
instructive improvement as the bedrock of entrepreneurial emergence, because it represses the imaginative and testing nature of the enterprise. The contention against instructive advancement as a bedrock of entrepreneurial emergence and improvement has all the earmarks of being bolstered by the perception of business possession, most business endeavours are not owned by individuals with high formal instructive capabilities. Best case scenario most of them with formal training are first degree holders and are not top of the line graduates. A direct clarification is proposed; exceptionally instructed people are excessively level-headed in considering, making it impossible to be alright with the risk of disappointment in owning their business. Again instructive advancement makes individuals to be aware of their status or to have a feeling of status and to build up some sort of pride which does not permit them to take part in certain sort of business endeavours and frequently embarrassed to begin on the little scale as they could bear. They are for this reason more comfortable with paid occupation either with government foundations or with built up private associations (Ford et al. 2009; Fayolle and Gailly 2015; Kneebone et al. 2007).

Besides, exceptionally instructed people are typically spooky by the trepidation of the uncertainty to embark on self-employment bearing in mind the impulses of the business environment. They need to maintain a wage stipulated occupation as opposed to owning a business of their own, with all the danger and issues that are included. It is thus that a large portion of the little scale organizations is owned by individuals with no or minimal instructive foundation. While there could be some truth in what has been said about education and educated people, it is crucial to differentiate between what constitute education since informal education is certainly a form of education. Individuals who are not employable into paid occupations since they need western training and the individuals who trust that notwithstanding when they get employed their compensations would be excessively small on account of their instructive situation to have the capacity to address their issues. Hence, we find that the little scale commercial ventures regularly viewed as the confirmation of entrepreneurial society and the foundation of industrialization and monetary improvement, are overwhelmed by humbly instructed individuals especially in developing nations, for example, African nations (Kuratko, 2005).

In any case, lately, the understanding is evolving. Quite a number of graduates are starting to consider having their organizations and being self-employed in varying zones of business they can discover opportunities. This change of disposition and introduction is essential because of the difficulties of monetary substances as far as unemployment,
which has gone up against them in present times, abandoning them without any options for survival other than independent work. There is doubtlessly instructive projects in enterprise for individuals from the general population, for example, workshops, classes, motivational talks, meetings and incorporation of business enterprise in schools educational modules, have had a great deal of effects in the change of introduction towards business proprietorship yet all things considered, as it has been demonstrated to, it is not training in its general shape that record for such change (Kuratko and Hodgetts 1998; Kuratko 2005).

4.12.3 Displacement theory

This school of thought depends on impacts of groups. It holds that grouping practices create certain relocations that drive a person into an entrepreneurial endeavour. Two noteworthy sorts of displacement distinguished in the socio-cultural environment are social displacement and financial displacement. Social displacement (Dedekuma 2014; Oghenerobaro 2012) is the prevention from specific employments or expert fields as an after-effect of social variables, for example, ethnic foundation, religion, race, and sex. At the point when people face segregation because of these components and are rejected from specific fields, they are compelled to practice the main option open to them, that is, to turn towards entrepreneurial endeavour.

Financial displacement is focused on the monetary varieties of subsidence and discouragement (Kuratko and Hodgetts, 1998). Basically, financial dislodging is brought about by the different changes that tend to influence the economy adversely, and in this manner the monetary status of the person by the method of employment misfortune (conservation), capital shrinkage and new financial circumstances that are good and strong of business endeavours. Any of these can serve as an establishment for entrepreneurial interest or emergence. The displacement school of thought is obviously valid for most business visionaries in numerous social orders. Numerous individuals who have gotten to be business people have turned out to be so because of relocation circumstances especially because of inaccessibility of occupations or occupation misfortune on account of the individuals who were in ann employment before their pickle (Kuratko, 2005).
4.12.4 Pull-Push theory

This hypothesis sets that entrepreneurial inspiration and emergence is chiefly affected by incubation (sustaining environment expected to create and develop organizations) variables identifying with past work experience, either positive or negative, in associations or organizations in which the individual has been employed. Such factors are classified into two firmly related groupings called Pull actors and Push elements (Gilad and Levine, 1986) this thus characterizes two gatherings of business people; the individuals who were Pulled into beginning a business and the individuals who were Pushed into it. Pull elements are certain elements and give positive thought processes to setting up business. Business people in this classification have destinations which are self-arranged, empowering them to satisfy individual desire instead of an exclusively monetary benefit. They are ready to go to show their own abilities to others and obtain freedom and work for themselves (Boer et al., 1997). In actuality, the push variables are negative elements and thusly give negative thought process to beginning a business. Business people in the push classification are people who have contrary encounters in their financial life and are pushed into owning a business as a way to get out and obtain assurance, for instance, insurance from unemployment by people who are not able to find occupations or proper employments, low wage position, or reliance nature of pay livelihood.

A few examiners of the pull and push variables dichotomy have watched that the push business people are less fruitful than the pull business people. They have contended that this happened on the grounds that Push business people regularly put individual compensation over the more extended term survival of their endeavour. It follows they are more disposed to shut the business down instead of trade off their way of life if the business is not giving the normal financial prize. This contention is bolstered by the examination of (Hamilton, 1987) that distinguished people in the automatic Push business display a higher rate of disappointment and vocation development than those in the deliberate pull business (Boer et al., 1997).

4.13 Chapter Summary and Concluding Remarks

Cognition or recognition of entrepreneurial prospect is at the heart of this study and as such, this chapter carefully examined and highlighted those aspects of the literature that
This chapter has captured an overview of the trends and mindsets that have evolved in the study of entrepreneurship, setting out the schools of thought that have formed the backcloth for the current study (Cunningham et al., 1991).

1 The great People thoughts: Assumes entrepreneurs are born with great initiative minds for innovation and discovery, and these they carried in their genes. This implies that entrepreneurial abilities are naturally inherent and could not be learnt which is considered not completely true as some aspect may be natural, but most other abilities can be learned (Garfield 1986; Hughes 1986; Silver 1985).

2 The Psychological thoughts: Assumes that entrepreneurs’ requirements, drives, attitude, philosophy, and ideals are the main determinant of behaviours. This is also a fact to a reasonable extent, but some entrepreneurs embark on this herculean task not motivated by any of the behaviours listed but rather due to economic pressure and the need to survive economically (McClelland 1965a; Begley and Boyd 1987; Lachman 1980).

3 The Classical thoughts: Perceives entrepreneurship as an opportunity hunting method of administration that ignites novelty (Process of creating opportunity). There is no doubt that entrepreneurs seek opportunities and finding/discovering one, makes all the difference. But, the act of discerning opportunity is an entrepreneurial culture that is cultivated over time through experience and education that informs expert judgement on perceived opportunity (Schumpeter 1934; Peterson 1985).

4 The Management School of thoughts: Views an entrepreneur as one who systematize or manages a business enterprise, with the risks for profits sake. (Series of learned management activities). It is a fact that an entrepreneur is expected to be a jack-of-all- trade and master of as many as possible in order to succeed. It follows therefore that, they should be able to appropriately combine both human and material resources to achieve a set entrepreneurial goal (Mill 1984; Good 1989; Kao 1989; Bird 1988).

5 The Leadership School of thoughts: Argues that, a good entrepreneur should be a good leader, people mentor, motivator and ability to get tasks accomplished.
Similar to the management school of thoughts, here the person (entrepreneur) is expected to display a good people motivating leadership style were subordinates or colleagues are eager to pursue the set entrepreneurial objectives under his/her supervision or directives (Hemphill 1959; Kao 1989; Bennis and Nanus 1985).

6 Intrapreneurship School of thoughts: Rather believes that an entrepreneur is one who has the ability to implement ideas without necessarily being owners of the business. This implies that the individual should be able to be convinced of a good idea and then act on it by asserting authoritatively a profitable drive in a business or organisation. Intrapreneurship is a concept that is centred on internal entrepreneurial activities, for an entrepreneur it implies behavioural action internal or within the entrepreneur (Burgelman 1983; Nielsen et al. 1985).

4.14 Problem
After a critical review of several kinds of literature on this subject, we still have not found explanations to how entrepreneurial ideas may be generated, how entrepreneurial opportunity is recognized and acted on and the nature of the process that result in this phenomenon.

In order to find suitable and factual answers to these gaps, a model framework is developed in the following chapters to capture typical entrepreneurial behaviour concentrating on opportunity recognition and idea generation.

A literature review as seen in the preceding chapters has shown support and alignment to the strong effects of certain variables in the study, pursuit, and process of entrepreneurship. Amongst the many variables pointed to in the literature, the following has been seen to be more recurrent and generally acceptable as impacting the entrepreneurial endeavour. They include;

- **Technology** know-how of the entrepreneur
- **Prior Knowledge** of the entrepreneur
- Operating **Social Network** of the entrepreneur
- Economic and Commercial **Environment** of the entrepreneur and
- **Personality Trait** of the entrepreneur

Nearly 95% of the literature reviewed seem to conjecture or imply that all entrepreneurial pursuits are similar in principle (i.e. its pursuit and experience associated with the act). These notions tend to present the concept and process of entrepreneurial emergence as static or better put flat. The question then arises thereafter, are entrepreneurial processes
flat? It is true that most or all entrepreneurial processes are planned. But the question still remains; do these processes actually follow a defined plan, pattern or path? This research holds the view that entrepreneurial processes are not homogeneous and do not follow a planned course. This is because the study suggests that due to continuous feedback (knowledge applications and updates) in the process loop, the planned course is detoured and instead, an unplanned process emerges. To capture this concept, the research utilised a system thinking approach adapted from (Patel, 2006) and implemented using Bayesian probability model.
Chapter 5: Research Framework Concept

5.1 Conceptual Framework

Computers are staggeringlly quick, precise, and idiotic. People are fantastically moderate, erroneous, and splendid. Together they are capable beyond imaginative force .... (Albert Einstein, n.d.)

5.2 Introduction

The development of the conceptual framework requires such imagination as suggested by Albert Einstein as quoted above. As a consequence, a problem in the research literature was identified, and probabilities constructed. Business people recognize business chances to make and convey quality to partners and consumers alike. While apparatus of chance might be perceived, this research concludes that opportunities are made and not found. It is the response of a potential entrepreneur to instinct, influenced by the prior knowledge that establishes the conviction to embark on an entrepreneurial endeavour. This agrees with Steve Job's statement in his biography by Walter Isaacson: People do not know what they want, therefore; it is the entrepreneur’s responsibility to create satisfaction and sometimes the preceding hunger (Walter, 2011). The following sections will be discussing the variables (Personality Trait, Social Network, Prior Knowledge, Environment, and Technology) and how they interact in a complex manner to form a complex adaptive entrepreneurial system.

Opportunity Creation is a Bayesian expression of the joint and conditional probability of

\[ \text{exp6} \]

Where, \( PT \rightarrow \) Personality Trait, \( SN \rightarrow \) Social Network, \( PK \rightarrow \) Prior Knowledge, \( EV \rightarrow \) Environment, \( TE \rightarrow \) Technology and \( \alpha \rightarrow \) Other Unknown Influences
Bayesian Probability Expression Flow Chart

Given Conditions

Prior Knowledge (PK)
- Experience
- Education

Personality Trait (PT)
- Leadership Skills
- Risk Tolerance
- Persistence etc

Social Network (SN)
- Income
- Family

Technology Know-how (TE)
- Research
- Innovation
- Invention
- Initiative

Environment Type (EV)
- Development
- Political
- Economical
- Cultural

Emergence | Attributes
PK|Elements
PT|Elements
SN|Elements
TE|Elements
EV|Elements

Bayesian Engine

Emergence Attribute of and Entrepreneur
5.3 The Conceptual Model

Given that we can consider complexity to be a component of our level of comprehension, it permits us to cut the Gordian knot of these issues (Fuller et al., 2008). Issues break up when met with reactions that recognize the way of complexity. Such solution incorporates breaking-up the issues into reasonable chunks, to the point where simple reasoning can be applied (Lichtenstein, 2000).

Today's administrators and directors are ceaselessly being confronted with issues that are excessively intricate, making it impossible to manage successfully utilizing any of the present well-known methodologies. This means that, we are rather applying our antiquated straight solutions to new, complex issues, and instead of creating solutions, we are winding up with more serious issues and more disarray (Michael, 2011). Development of business sectors, innovations, and ignorant regulations are heightening the complexity of our operations, and we are moving further and further far from the possibility of determination.

5.3.1 Framework

Dynamics of a complex framework is controlled by a wide variety of common components that interface crosswise over and along the framework mechanism (Phalla, 2010). Every system creates serious uncertainty and with the exception of the extremely uncommon circumstances, none of these components alone dominate the system such that the others can be disregarded. Hence, making a hypothesis that could depict the framework conduct by a method for organising the set of rules for mathematical comparisons is implausible and might be deluding too (Lichtenstein, 2010). A most critical element of complex frameworks is re-occurrences of fascinating occasions; uncommon occasions of low likelihood, however, constitute a high effect on a framework where they happen.

In various intentions, they are otherwise called critical transitions, calamities, disasters, and emergencies. Among the consistent conduct examples of complex frameworks are sinister ones that develop all the more as often as possible as a great occasion approaches (Baron and Ensley 2006; Chwif et al. 1996; Epstein 1999). Portentous patterns and
extreme occasions are continuous indications of a framework's dynamics.

These trends may not trigger great occasions but rather just flag the development of uncertainty, making the framework ready for extreme events. Finding premonitory patterns creates a basis for the development of algorithms for prediction of extreme events and is key to elemental comprehension of relevant complex systems (Knight 2012; Sonnessa 2004). Specifically, the following types of premonitory patterns have been identified formerly: intensity, clustering, the range of correlation in space, and change of scaling. In this study the change in scaling of uniformly defined background events has been found before the following extreme occasions in four complex frameworks: monetary subsidence, surges in murders in a megacity, magnetic tempests(storms), and earth tremors (Lorenz 2000; Smith n.d.; Hartford 1994). The background events are constituted by changes in trends of the observed indicators describing the system behaviour. A premonitory trend common to all four events considered is formulated as follows: background events with relatively large magnitudes become more frequent before an extreme event (Gilbert 2004; Boyer et al. 2004).

The conceptual framework for entrepreneurial opportunity emergence was developed from the themes identified in the extant literature. They include Personality trait, Prior knowledge, Social network, Business environment and Technology know-how as pictured in Figure 5.1 and sourced as in Table 5.1.

Agents’ behaviours → Result in opportunity → Entrepreneurial Opportunity

Figure 5.1: Detailed Conceptual Framework.
5.3.2 The Concept of Emergent Personality Traits

People tend to be disposed to be unable to overcome character defects, similar to an absence of self-discipline, or being biased. Behavioural financial experts have utilized investigations of individuals attempting to stop smoking or get in shape as illustrations of how genuine individuals neglect to be completely objective in their everyday life. This has actually driven numerous behavioural business analysts to challenge the legitimacy and estimation of customary monetary models since they seem to conflict with reality.

Notwithstanding, things are more confusing still.

Despite the fact that individuals plainly experience the ill effects of the inclinations found by behavioural business analysts, Nobel Laureate an experimental financial expert (Smith, 1962) has found that customary financial aspects still can make exact expectations of the conduct of collections of individuals. While they may not know the majority of the data important to make supply measure up to demand, these groups of individuals with little information can in any case achieve the steady cost by transacting business and even with biased conduct and inadequate knowledge.

This might appear to be peculiar, since customary financial models apparently depend on the ideal levelheadedness of the exemplified individuals to work. Be that as it may, truth be told, individuals in test markets (and genuine markets) are getting to be more brilliant through their unconstrained communication.

The incongruity is that these people have no clue that they are making supply level with demand, the result a customary monetary model would foresee. In any case, by essentially exchanging and cooperating despite everything they make this general impact. This has driven Vernon Smith to allude back to the work of masterminds like Adam Smith, creator of the Wealth of Nations, and Adam Ferguson. Orderliness is being created by human activity, however not by human configuration. As such, individuals do not necessary need to be hyper-normal computing or articulating machines to fathom the intricate mathematical statements important to bring markets into coordination. Human cooperation, taken in total, is more meaningful than the summation of its parts.
5.3.3 The Concept of Entrepreneurial Environment System;

An entrepreneurial framework comprises of an intricacy and differing qualities of characters, parts and ecological variables that collaborate to decide the entrepreneurial performance of an area or region (Spilling, 1996).

In order to properly consider this explanation, consider the definition of the system. System: is an entire unit that cannot be partitioned into autonomous parts in light of the fact that the conduct of the parts and their consequences for the whole relies upon the conduct of the considerable number of parts collaborating with each other (Patel, 2006). Hence, one should note that the smallest variation in any agent or its derivative parts can result in significant change in emergence due to possible perturbation (The butterfly effect) (Lorenz, 2000).

The opportunity therefore as recognised by an entrepreneur tends to emerge from the interaction of their potentials with the environment over knowledge which could be technology driven or perhaps acquired over time. The potentials, environment, and knowledge are among the agents which interact with one another. It could be seen that each agent exists as a system which is composed of variables which if altered, influences the entire emergence cycle through ripple effects thereby leading to new, altered or reproduced system (Patel and Paul, 2010). In social sciences, it has been observed that we evolve different behaviours in our own lives as we try to adjust to the environment around us. For instance, we become faster and more efficient at our job over time. While this process happens without any biological evolution and result from some sort of trial and error, this method of learning and changes is what complexity theory is (Mcmaster n.d.; Anon n.d.). But complex systems like economies are by their very nature beyond the control of a single actor or mind.

5.3.4 The Concept of Entrepreneurial Prior Knowledge

In entrepreneurship, individuals' know-how varies across people even when they share common traits. The minute or insignificant differences between the elementary behaviours of the participating entrepreneurs are actually the roots of the variation in emergence observed with entrepreneurs. In this study, the researcher has often posited that no two entrepreneurs are exactly the same even when they share a lot in common. Even in biological genetics, it has been ascertained that identical twins are different
individuals although they may share a lot in similarity but their individual response to happenings vary based on their character and experience contents (Eroglu and Picak 2011; Agbim 2014).

Social scientists have always envied the certainty and precision of physics. Unfortunately, apparent subject of study – living, breathing human beings – is far less stable and predictable than gravity and other stable matters and elements of physics (Anon n.d.). Of course, the supposed stability of mathematics and physics disappeared seventy years ago with the discovery of non-deterministic concepts such as quantum theory and Gödel’s uncertainty theory. The tools developed to tackle such subjects, together with newer ones like complexity theory, can be applied to problems formed from the social sciences.

Conventional financial matters became advanced in this period of more strict presumptions about human reasonability. For these models to give significant expectations or needed results, individuals are frequently studied in the light of computers abilities, with flawless recollections, numerical wizardry, and complete data about the past, present, and future. It ought not to come as a shock that genuine individuals, considered in research centres and in monetary experiments, neglect to accomplish the levels of impeccable levelheadedness required in customary financial aspects. This is on account of genuine human conduct goes amiss from conventional monetary judiciousness in steady ways that behavioural financial analysts call inclinations. For instance, when confronted with troublesome inquiries or choices, individuals are prone to pick whichever answer is the default, regardless of the fact that customary financial matters predicts that they would pick something else. Behavioural financial analysts call this existing conditions inclination or status quo bias. The trouble of doing the reasoning important to make the flawlessly balanced choice leaves numerous individuals selecting the default (Grossberg, 1988).

5.3.5 The Concept of Entrepreneurial Technology

Each development in computer technology has presented new opportunities for business; this new entrepreneurial opportunity extends beyond the individual or firm to incorporate industry, society and the region of concern. It tends to emerge from the collective interactions of the elements which form the building block of the entity derived through the process of opportunity formation.
McClelland (1965) inferred in his theory of needs that human beings are motivated by their desires for achieving physiological, self-actualization (self-esteem) and safety satisfaction. He further stated that irrespective of gender, culture or age, the dominant driver of human motivation is highly dependent on our culture and life experience.

Having the capacity to live effectively in a universe of expanding complexity requires capability in two unmistakable ranges. One is the ability to build unpredictability with the end goal of creating advancement, adjustment, development and persistent improvement (Micheal, 2011). The other is the capacity to take something that is excessively mind boggling for us, making it impossible to comprehend and decrease it to a level where we can be meaningful (Dimo, 2010). This applies to issues that have insane, or where our present comprehension abandons us with arrangements that are inadequate, too unreasonable or even irritate the issue. Regularly issues grow gradually after some time, and we neglect to notice that they are turning out to be more mind boggling and wild. We pass them off as the way things are and are half eager to acknowledge them as human issues which cannot be tackled. We contribute time, vitality and assets both in endeavouring to determine these issues and in discovering approaches to living with them yet we remain surrendered to the thought that they will be around in any case.

Without a doubt globalization, data innovation and manageability present us with new difficulties of understanding, outlining and overseeing frameworks that are very interconnected, associated and non-direct which are currently called complex frameworks (Lü et al. 2004; Vanpaemel n.d.). This is the place complexity science is valuable to give us elective logical strategies more qualified to scrutinizing these mind boggling frameworks. Upheld by a worldview that sees the world as an arrangement of interconnected components whose communications offers ascend to the examples that we see in our general surroundings.

5.3.6 The Concept of Entrepreneurial Social Network

Simulated life is the investigation of synthetic frameworks that shows the conduct and attributes of normal living frameworks; it compliments conventional natural sciences by endeavouring to create real life-like practices inside of computers. In this simulation, therefore, entrepreneurial emergence does not result just because the individual or groups
involved wish to be entrepreneurs but, through the organised, quantified knowledge and levels of personal beliefs in the occurrence of these attributes as well as the economic prevalence in the immediate and envisioned future environment.

Scientists usually try to remove themselves from the world at large entering the laboratory to look at a small piece of the world that they have isolated and controlled with utmost care. Where laboratory evaluation is not feasible, they use statistical analysis for observation this eliminates what is called noise or error from their data. Traditional scientific methods and concepts simplify the methods into a conceptually coherent scheme and also eliminate the complexity manifest in the real world. This researcher in view of these concepts applies simulation to effectuate and evaluate the observation of our entrepreneurial universe or world. Emergent computation together with a related area known as artificial life deals with the logic of self-organization, research in emergent computation is revealing new natural laws that are in a sense the laws of intelligence. It is now becoming apparent that emergent patterns are interlinked in a number of ways; they also seem to coherently unify system that provides new richer and more open ideas of science itself. It is worthwhile to explore this area more to understand the emerging new science of complexity of order out of chaos, the science of creation. This is the science that will shape the twenty-first century (Piccardi 2013; Greve 1995; Norman 2011).

Complexity science utilizes the ideas of complex nature hypotheses, for example, self-organisation (flocking conduct), system hypothesis (Bayesian nodal systems), adjustment and evolution. This new hypothetical structure is consolidated with new strategies, for example, specialists (agents) based modelling instead of explaining the phenomenon we see regarding laws of nature encoded in mathematical statements. Agents based demonstrations take a more bottom-up methodology depicting them as the emergent events of closer level association of agents that are represented by basic principles (Gilbert 2004; Siddiqi and Niazi 2013; Niazi 2014). It ponders the unpredictable frameworks in our universes that have beforehand fallen between the gaps of the present day science, for example, informal organization (enterprise).

5.4 Dynamics of Emergence

Because agents modify their behaviour in the environments to suit prevailing conditions, these results in shifts in the emerging enterprises. Therefore, it is imperative to critically evaluate the interactions of agents in the environment which alters emergence. Lumpkin raises many questions. Does this happen through opportunity recognition? What is
Opportunity recognition? One possible answer is that it is the capacity to distinguish a smart thought and change it into a business idea that includes worth and creates incomes. What is an idea? Is it a mental perception of possible reality? Or perhaps, it is simply emergence (Lumpkin and Lichtenstein, 2005).

In the past two decades, we have seen what can be described as a short courtship and eventual marriage between business and technology. This relationship has given birth to technology-driven businesses and on the spine of these innovations is crafted in the dynamics that takes into cognisance changing environmental conditions and the evolution of customers expectations (Phalla, 2010). Firms and other organisations take part in business to expand operation through both key reformation and the formation of new business opportunities. But how do firms and businesses emerge? Because our complex world is full of uncertainties and constantly undergoing changes that result from discoveries and innovations, the static and traditional ideologies of 18th and 19th centuries economics has failed to provide a proper understanding of the evolutions present in the economics. These previously held ideologies are beginning to give way to more rational dynamic view where ideas, firms and economies evolve in the face of cutting edge thinking and philosophy. These evolutions are more appropriate examined using the tools of complexity theories.

5.5 Defining Complexity

Complexity emerges when the conditions among the components of a framework get to be critical, as well as unclear. In such a framework, removing one such component wrecks conduct to a degree that goes well past what is exemplified by the specific component that is discarded.

Complexity is a comparative circumstance that exists to the extent that it becomes difficult to comprehend the interactions among a system's component parts. A car is complex relative to a bicycle, but very simple relative to an economy. At some point of intricacy, we (humans) are not sufficiently expert to detect some fundamental pattern by observing its component parts in isolation. At that point we say that there is some 'emergent behaviour' and declare the system officially 'complex' (Patel and Paul 2010; Van 2005).

Emergent Behaviour; this implies that the general characteristics of the structure cannot be described in terms of the behaviour of its integral parts (Lichtenstein, 2011). For
example, consciousness is an emergent behaviour of the brain that cannot be explained in terms of the properties of individual neurons. Emergent behaviours are the result of the non-linear interaction of the system's constituent parts (Chwif et al., 2000). A system, therefore, exhibits collective responses to external perturbations. This means that perturbations on one part will propagate to the entire system, affecting (non-linearly) its entire behaviour (Van, 2005).

Complexity discipline is a new method or approach to science which has arisen over the past few decades and enabling us to apply another concept to our general logical enquiry.

This research is a style enquiry into the world around us. In doing so, it investigates the interrelationships between component particles in the entrepreneurial system that gives them their unique behaviour or properties. Therefore, a bottom-up approach was considered more appropriate as it very carefully allows the individual evaluation of the lower level particles, their interactions, and the consequent nonlinear resulting behaviours. Hence, the lower level particles laws (i.e. elements of a system) control the behaviour of the higher level (i.e. systems).

![Figure 5.2 Nature of entrepreneurial complexity system expressed in this research](image)

‘Artificial’ physics set up with arbitrary rules is used to develop a new kind of science study called simulation. The flexibility for the researcher to adjust the rules to make an observation on the consequences is in the heart of modern complexity research. Building a system or a whole from the fundamentals becomes impossible as the behaviour of the whole does not add up from the combinations of the basic components but from the interactions between it and the outcome is most time not accurately certain hence, this study opined that the behaviour of the whole emerges from the interactions of the
5.5.1 *Comparison with Living System Complexity*

Living systems are frameworks that exist in continuous pressure in the middle of orderliness and turmoil in phase transition. Although living systems are likened to biological (organic), chemical, material or physical systems, in this study a comparative analogy is observed as seen in entrepreneurial activities. The constant and continuous change evident in an entrepreneurial environment is a tactical shift mechanism termed phase transition in an entrepreneurial system. However, the phase transition is the radical movement of a framework starting with one condition then onto the next with exceedingly distinctive properties (behaviours).

There are two kinds of phase transitions: first order and second order. In the first order, the shift is abrupt and the system varies from one state to another which is not very typical of entrepreneurship but in the second order, the shift is more gradual or continuous. It is the second order phase transition that is prevalent among entrepreneurs where there exist fluid stability amid order and chaos which are interlocked in an intricate ever-changing bop of complexity. This transition phase is characterised by highly non-linear phenomena which rightly describes our study as complex phenomena (Lü et al., 2004).

Since entrepreneurs are humans, let us briefly examine the impact of human rules and the eventual evolution to an unpredicted direct outcome.

As interaction with each other in an economic system becomes more complex, the tenets and criticism circles inside of the framework likewise turn out to be more intricate. The rise of self-intelligent cognizance in individuals presents another wonder in rules making. That is, the ability to consider and anticipate the results of various types obviously of activity and purposely pick the standards we think will prompt a wanted future framework states (Davidsson and Wiklund 2001; Kneebone et al. 2007). In this frameworks, the standards are the mental models business people use to choose how to carry on (embark on the business transaction). While some of this models are built on biology (Hormonal activities), others are created out of our social and past encounters. These standards have all the earmarks of being encoded in the society as convictions, qualities, traditions, ethics, laws and hypotheses. It is this human character that permits business people to make unnatural and planned frameworks which include businesses and empires.
5.6 Entrepreneurial opportunity emergence

This concept is assumed to emerge through fortuitous phenomena. Referring to Figure 5.1, this research argues that the five variables combine fortuitously to produce opportunity. The degree of its complexity is founded on the concept that a little change in any variable in Figure 5.1 is capable of triggering an unimaginable overall outcome in the kind of opportunity that will result. Therefore, a little cause which gets away from our notification produces an extensive impact that we cannot ignore, and afterward, we say that the impact is because of chance. On the off chance that we knew precisely the laws of nature and the circumstance of the universe at the starting minute, we could foresee precisely the circumstance of that same universe at a succeeding minute. In any case, regardless of the possibility that it was the situation that the normal laws had no more any mystery for us, we could in any case just know the starting circumstance roughly (Darley, 1994). If that empowered us to anticipate the succeeding circumstance with the same estimation, that is all we ought to say that the event had been anticipated, that it is controlled by laws. Yet, it is not generally so: it might happen that little contrast in introductory circumstances creates extremely incredible outcome in the final analysis. A little blunder in the previous will create a tremendous mistake in the latter. The forecast gets to be incomprehensible, and we then have the fortuitous phenomenon as portrayed (Darley, 1994).

5.7 Reductionism as a Misfit in Complexity

Reductionism is a way to deal with the comprehension of complex things by diminishing them to the connections of their parts, or to simpler or more basic things. It can likewise be portrayed as the philosophical position that an intricate framework is only the entirety of its parts and that an account of it can be diminished to accounts of individual constituents. In this manner, the belief that everything that exists is produced using a little number of fundamental substances that carry on in general ways, and is accordingly in a few regards similar to Atomism. Reductionist speculation and strategies are the premises for a hefty portion of the all around well-developed practices of advanced science, including quite a bit of material science, chemistry science, and cell science. In any case, while it is usually acknowledged that, most parts of science depend on material science and that biology has its fundamentals in chemistry, it appears relatively substantial with
material physics but has failed to explain the concept of a whole whose constituent parts when added up did not explain or yield the product.

A major criticism of a reductionist point of view is that they are excessively oversimplified in light of the fact that they disregard the complexities of human conduct and experience. Behaviours regularly has various diverse causes and to decrease the conceivable clarifications to one level can just yield an incomplete comprehension. In any case, preference of the reductionist perspectives is that by separating a phenomenon to its constituent parts it might be conceivable to comprehend the entirety. As this study continues to argue that act of a personality becoming an entrepreneur is complex and emergent it appears that the literature has not provided a more comprehensive notion or idea of how entrepreneurship develops. Reductionism held sway until the chaotic nature of the world around us and its constituent elements inherently inundate our scientific enquiries with non-linear patterns and behaviours. This, therefore, places an enquiry for a new kind of science that can effectively explain the non-linear behaviours that abound in the interrelationships between elements (Hartford 1994; Mitleton-kelly 2003).

5.8 Chapter Summary and Concluding Remarks

This chapter was intended to clearly illustrate the conceptual thoughts used in this research and to convey these concepts in the simplest way possible. The research framework is expected to holistically present all the factors/elements/parts that influence the process of entrepreneurial opportunity emergence as considered within the context of this research work.

The graphical schema (see Figure 5.2: Nature of entrepreneurial complexity system expressed in this research……….1) shows how these elements interconnect and interact to lead to the ultimate outcome which I called opportunity emergence.

The next chapter will further highlight and elaborate on the methodology and introduction to the analysis of variable as conceived of this study, showing the variation of inherent and learned entrepreneurial abilities as factored into the simulator. These variations were aimed at emulating the real world scenario.
Chapter 6: Research Methodology

6.1 Methodology

Following on the literature review and the conceptual framework, a Bayesian model of analysis of agent behaviour was concurred to be appropriate for this simulation experiment. Therefore, I describe the agent based model implemented in this thesis as, a type of miniature form of representation that, involves the simulation of the concurrent behaviours and exchanges between many agents in an effort to re-create and forecast the nature of a rather complex phenomena like entrepreneurship and its emergence.

The process is one of emergence which means; events whereby larger incident arise through interactions between smaller or simpler incidents such that the larger incident demonstrate properties the smaller/simpler incidents do not exhibit. This implies that, transition through interactions from lower levels of systems to a higher level follows a simple behavioural principles or rules which then generate complex entities. This notion is extensively adopted in the scholarly field of modelling which is equally guarded by central theme that implies that, the whole (eventual entrepreneur) is greater than the sum (assembling the behaviours of entrepreneurs) without considering the sequence of interactions that yield the emergent behaviour (Bonabeau, 2002).

Individual agents are typically characterized as rationally bounded, presumed to be acting in what they perceive as their own interests, utilizing such as prior-knowledge, personality trait, social network, technological know-how and economic environments using heuristics or simple decision-making rules as conceived within this research.

![Figure 6.1: A typical Agent Object as conceived in this research](image)
The agent based simulation in the context of this research will entail, the measure of the inclinations and behavioural tendencies among the agents along the following parameters; prior-knowledge, personality trait, social network, technological know-how and economic environments. A further explanation of the measure of the Bayesian probability processes and procedures is provided in detail in section 6.3 and it sub-sections later in this chapter.

6.1.1 Introduction

This research displays both qualitative and quantitative methods. It is qualitative because most of the entrepreneurial characteristics being simulated are expressed in terms of qualities that are readily observed. The quantitative aspect is used for simulating numerical measures of the probability.

According to these opinions, two very basic level diverse world perspectives underlie quantitative and subjective exploration. The quantitative perspective is depicted as being realist or some of the time positivist while the world perspective of subjective examination is seen as being subjectivist. What does this mean? Realists take the perspective that, what research does is reveal a current reality. The fact of the matter is out there and it is the occupation of the scientist to utilize target research strategies to reveal that truth (Nixdorff 2008; Vanpaemel n.d.). This implies that the scientist should be as withdrawn from the examination as could be expected under the circumstances, and use techniques that boost objectivity and minimize the association of the specialist in the exploration. To fulfil these, the researcher has employed simulations, questionnaire, and online surveys to collate data used for analysis of the crux of this study (Nixdorff, 2008). The research methodology has demanded a comprehensive and careful evaluation of existing literature and its data. As a consequence, a gap in the research was identified, and hypothesis constructed and, using research questionnaires and simulations, data was generated for analysis (synthesis). The data generated via simulation is a prediction which the researcher compared with the real-life behaviour of human individual and groups.

This study is motivated by the desire to see more people empowered for entrepreneurship in order to adequately fight poverty as well as grow the economy of third world economies. Nigeria will serve as a case study
6.1.2 Qualitative Approach

Subjective research is primarily investigative examination. It is deployed to properly comprehend the unknown details, inferences, and inspirations. It gives bits of information into the problem or generates views or models for probable quantifiable examination. Subjective Research is similarly used to reveal patterns in thought and conclusions, and plummet more deep into the issue. Subjective data accumulation strategies change employing unstructured or semi-organized procedures. Some typical stratagems integrate focus group or group discussions, personal interviews, and interest or opinions. The sample size is ordinarily little, and respondents are chosen to satisfy a given share.

As indicated by this point of view, subjective analysts are subjectivists. As opposed to the realist who sees that the truth is out there and can be impartially measured and found through examination, it focuses to the piece of human subjectivity over the span of the exploration. The fact of the matter is not out there to be nonpartisan and fairly seen by individuals, yet is in any occasion to a restricted degree created by us and by our recognitions. It presumes that there is no previous target reality that can be viewed. The methods of our watching reality changes and changes it, and along these lines subjectivists are relativistic. All truth must be relative, and is never finished, as the positivist cases.

6.1.3 Quantitative Approach

Quantitative exploration is a formal, objective, systematic procedures in which numerical data are used to get information about the world. This examination system is used: to depict variables; to take a gander at associations among variables; to choose circumstances and finished results correspondences between variables.

It is used to gauge the issue by a strategy for delivering numerical data or data that can be changed into useable insights. It is used to assess perspectives, suppositions, practices, and other described variables and aggregate up results from a greater specimen masses. Quantitative Research uses quantifiable data to formulate possibilities and uncover designs in investigation.

To ensure a more balanced result from the data, statistical pattern recognition methodology was employed in making sense of the data in the analysis Chapter.
Measurable or statistical pattern identification draws from already existing ideas in factual decision theory to separate amongst information from various groupings based upon quantitative components of the information. There are wide ranges of measurable systems that can be utilized inside of the description task for qualities extraction, running from basic clear measurements to intricate changes. The quantitative elements separated from every business visionary for factual trend identification are sorted out into a five-category Likert scale and interpreted into likelihood where the importance connected with every element is dictated by its overall influence on the eventual outcome of the analysis.

Therefore, there is a need for automatic recognition, explanation, and categorization of trends which are observed as an important problem in a selection of engineering and science disciplines. The ability to recognise a pattern is usually not given enough attention or valued until faced with the challenge of instructing a machine to do the same. But what actually is a pattern? A pattern has been defined as the opposite of chaos and the ability to recognise. This leads to the suggestion that pattern recognition is a systemic study of the environment by a machine to learn how to distinguish the items of enthusiasm from their experience furthermore settle on a sensible choice about the class or classification of the observed trend or design. All the more formally, pattern cognition portrays an intellectual process that matches data from a stimulus with data recovered from memory.

The quantitative way of factual and orderly trend recognition makes it hard to segregate (see a distinction) among a collection of patterns in view of the auxiliary sub-designs and their interrelationships installed inside of the information. This confinement gave the catalyst to the improvement of a basic way to deal with pattern identification that is bolstered by mental proof relating to the working of human observation and discernment. Object acknowledgment in people has been exhibited to include mental depictions of unequivocal, structure-oriented attributes of objects, and human intellectual choices have appeared to have been made on the premise of the level of closeness amid the identified components and those of a sample that was drawn for every class. Class here alludes to sorts of business people. Case in point, the identification of segments hypothesis clarifies the procedure of pattern recognition in people: where based on registered perception, individuals or groups are categorized into segments created in the human mind. But in reality, it becomes rather difficult to visibly create a fuzzy boundary where entrepreneur’s behaviours can begin or terminate. It appears impossible because humans are not machines and the mind continuously evolves as it feeds on heuristics and visible inputs.
on a daily basis.

In order to put this concept into proper perspective, the researcher considered structure as an appropriate way of concretizing the intangible cognition. Hence, the structure is a basic, inimitable or impalpable thought suggesting the identification, perception, nature, and perpetual quality of patterns and connections of elements. This thought might itself be a material, for example, an assembled structure, or a quality, for example, the structure of society. From a child's verbal depiction of a snowflake to the point by point investigative examination of the properties of magnetic fields, the idea of structure is presently and regularly a crucial establishment of each method of request and revelation in science, logic, and art.

6.2 Modelling Complex emergent behaviour; a non-linear approach

It is obviously difficult to find a single mathematical expression of the expected emergent behaviours of the system as the nature of its interaction is not predictable and even if it is, the consequent perturbation effect of a variation in the character of an agent or its element or the sub-element of an agent's element could result in unpredictable system state which is a new emergent behaviour (Forrest and John, 1990).

The customary procedure of model-building includes creating and testing the hypothesis through a cycle of actuation and conclusion. In this, the researcher has comparative sentiment with (Popper, 1959) who contends that science continues to a procedure of guess, thereupon counter-guess which is achieved through a blended procedure of affectation and conclusion. Models are speculated as theories – inductively as for information or former thoughts – and are then tried and refined through standing up to their forecasts with new information both deductively and inductively (Yingxu and Guenther, 2007). The procedure is puzzled. Speculations might emerge seeing that they are the result of experiences, however, they can normally be applied in collecting information, determining relations, building theories, testing these on new information, misrepresenting them, possibly refining or changing them to make them pretty much bolder, as the information and setting recommend. Fundamentally, the procedure is one in which testing and approval include both hypothesis and information with no benefit given to one or the other (Colin and Dailey 1996; Chwif et al. 2000).

Therefore, in order to properly understand the non-linearity repeatedly portrayed in this research, a model by way of simulating the expectation of the spurious effects agents and
their elements creates in a system is presented as a complex simulation of entrepreneurial opportunity emergence.

6.3 Simulation Design

6.3.1 Research Simulations
The mechanism for the simulator designed and deployed for this research is built based on the Bayesian network and probability schema. Since the Bayesian probability is subjective and a measure of the level of confidence or assurance that the operator (the researcher or the reader) has in the truth of a proposition, the simulation follows a stochastic uncertainty where the probability of hitting the target (very positive outcome) is set to 0.95 maximum.

The conceptual framework is translated into a comprehensive belief network where the probabilistic strengths (outcomes) in the interactions of the parents nodes, determines the character (probabilistic value) of the child (Bishop 2006; Specht 1990). The interactions are governed by the various conditions of relationships between the parents and children nodes and even the external peer influences. In order to make clear assimilation, an illustration and definitions of these conditions which are applicable upon warranting situation follow below.

Firstly, an explanation and description of Bayesian Networks are provided.

6.3.2 Bayesian Networks
A Bayesian Network (BN) is a graphical drawing of a combined likelihood distribution, demonstrating dependency and conditional dependence connections. A Bayesian system is drawn as a chart, with hubs and edges. Specifically, BNs are DAGs, (Directed acyclic diagrams), implying that their edges have a heading and that there are no circles inside of the chart. In a practical system, the hubs stand for the variables we are evaluating and the edges means the relationships amongst them (Specht 1990; Faltin and Kenett 2007; Delage et al. 2006).
6.3.3 Joint Probability Distribution

A joint likelihood dispersion over a collection of variables describes the likelihood of each of the variables assuming each of its qualities, with respect to the estimations of alternate variables. That is, it is not the collection of singular probabilities for every variable, except a joint dispersion, taking into consideration the estimation of one variable to influence the estimation of another. For instance, take two variables: daylight and downpour. While there might be a 60% likelihood of daylight on any given day of the year and a 25% likelihood of downpour on any given day of the year, it is surely sensible to expect that regardless of whether there is daylight on a specific day could collaborate with the likelihood of downpour on that day. The joint likelihood dissemination crosswise over daylight and downpour would consider this (Specht 1990; Faltin and Kenett 2007; Rish and Singh 2000).

6.3.4 Dependence and conditional independence relationships

This idea is an expansion of the past description and clarifications given in section 6.3.10. Two variables are dependent if learning of one gives prescient worth to information of another. For instance, information of the condition of daylight gives prescient quality to the likelihood of downpour. Independence is the inverse when learning of one variable gives no prescient worth to the information of another. For instance, learning of the shade of shirt you are wearing gives no prescient worth to the likelihood of downpour.

Conditional independence becomes possibly the most important factor when we have various variables that can all be associated. For instance, retreating to our daylight and downpour variables, we should include a third variable, regardless of whether you carry an umbrella with you. Suppose you live on the occasion, and just carry an umbrella in the event that it is drizzling at the very time you go out. For this situation, while beyond any doubt learning of daylight gives prescient quality to your umbrella carrying on the grounds that no sun implies it will probably be raining and in this manner more probable for you to be carrying an umbrella this prescient worth is completely intervened through the variable of a downpour. In the event that we definitely know regardless of whether it is drizzling, knowing regardless of whether it is sunny does not assist foresee your umbrella conveying. Here, the two variables of your umbrella conveying and daylight is conditionally independent given information of downpour (Rish and Singh, 2000).
For further illustration,

**Conditionally dependence**

The likelihood that occasion A will happen given that or on the condition that, occasion B has as of now happened. It is signified by $P(A|B)$. This implies the likelihood of (A) happening given that (B) has happened.

\[
P(A|B) = \frac{P(A \cap B)}{P(B)}
\]

Or

\[
P(B|A) = \frac{P(B \cap A)}{P(A)}
\]

*Where neither $P(A)$ nor $P(B) = 0$, that is, $P(A) > 0 < P(B)$.*

**Conditionally Independent**

Two actions A and B are said to be independent if,

\[
P(A|B) = P(A)
\]

or

\[
P(B|A) = P(B)
\]

That is, the probability of one occasion is not influenced by the event of the other occasion.

This last idea of conditional independence is fundamental to the strength of Bayesian systems for practical system deduction. It is the thing that empowers us to untie the connections among the variables inside of the system whose qualities might all be corresponded in some way and choose direct relationships (Faltin and Kenett 2007; Specht 1990; Rish and Singh 2000).

Let’s consider the variable factor node for which behaviour is under simulation.

### 6.3.5 Prior Knowledge (PK)

Economies have been described as a process characterized by discovery and learning according to (Philipsen, 1998). This leads to the entrepreneur(s) having superior information and knowledge and therefore takes advantage of the imperfect distribution of knowledge which is obvious to them due to awareness. Grunning (2004) called this level of awareness an element found in human decision-making process alertness, which is in
agreement with Kirzner who have also observed this phenomenon and called it a conscious belief which results sometimes from spontaneous learning. Nonetheless, more emphasis here has been given to the role rather than the behaviour. But (Casson, 2005) argues that people vary in taste and access to data; the business person continues on the premise of the one of a kind (distinctive) information accessible to him at any given time in space.

From the conceptual model, we see that PK is dependent on five other variables which include Education (Ed), Experience (Ex), Technology (TE), Environment (EV) and Social Network (SN).

Given this information, the probability of PK is estimated using dependence conditional relationship as below,

\[ P(P Ki) = P(Ed) \cap P(Ex) \ldots \ldots \ldots \ldots \text{exp7} \]

*Where \( P(P Ki) = P(Ed) \cap P(Ex) = P(Ed)*P(Ex) \) is the initial condition or status.*

But given Technology, Environment and Social Network,

\[ P(PK) = P(P Ki) + P(TE) * P(EV) * P(SN) \ldots \ldots \text{exp8} \]

In this same way, we shall extrapolate the derivatives of \( P(SN), P(TE), P(PT) \) and \( P(EV) \).
6.3.6 Social Network (SN)

The choice to become a business specialist (entrepreneur) is not only inclined to profiteer but by other non-economic concerns and societal contexts the individual(s) is (are) part of. The communal relations as described by (Granovetter, 1985) raises the question of structural embeddedness of individuals with the society. This highlights why it is complicated to describe innovation and business enterprise creation occurring in clusters in time and space without taking social relationships into consideration.

Also drawing from the framework as conceptualised, we have a picture that is as illustrated below for SN.

![Figure 6.3: Social Network Dependency Network Diagram.](image)

A close study of the graphic diagram above, one could logically ascertain the probability of SN as estimated using dependence conditional relationship under the scope of this research.

\[
P(SNi) = P(\text{Income}) \cap P(\text{Family}) = P(\text{Income}) \times P(\text{Family}) \ldots \ldots \text{this is the initial value without external influence.}
\]

However, given the perturbative effect of Ed, PT and EV the eventual behaviour of SN is derived as:
Technology (TE)

Technology as a dependent for emergence is assumed to be independent, and not really influenced by other factors for the purpose of this research except the level of education.

Therefore, the probability of Technological emergence is said to be influenced only by the following attributes, P(Initiative), P(Innovation), P(Invention), P(Research) and P(Education).

\[
P(\text{SN}) = P(\text{SNi}) + P(\text{Ed}) \times P(\text{PT}) \times P(\text{EV}) \ldots \ldots \exp9
\]

\[P(\text{TE}) = P(\text{TEi}) + P(\text{Ed}) \ldots \ldots \exp10\]

**Figure 6.4: Technology Dependency Network Diagram**

The figure above captures this illustration and hence, P(TE) is derived thus;

Let \( P(\text{Initiative}) = P(\text{Init}) \) and \( P(\text{Innovation}) = P(\text{Inn}) \) and \( P(\text{Invention}) = P(\text{Inv}) \) and \( P(\text{Research}) = P(\text{Res}) \)

\[
P(\text{TEi}) = P(\text{Initiative}) \cap P(\text{Innovation}) \cap P(\text{Invention}) \cap P(\text{Research}) = P(\text{Init}) \times P(\text{Inn}) \times P(\text{Inv}) \times P(\text{Res}). \] This refers to the initial condition.

But with the contributory effect of Education, we shall now have

\[P(\text{TE}) = P(\text{TEi}) + P(\text{Ed}) \ldots \ldots \exp10\]
6.3.8 Personality Traits (PT)

This characteristic factor is said to be unique per individual entrepreneur although there exist points of intersections which explain similarity to behavioural response to perceived or created opportunity.

Casson (2005) in his theoretical revision observed that people vary in their taste and also access to knowledge and Kirzner (1997) inclined his argument to the fact that it’s the individuals alertness (sensitivity to potential opportunities) that accounts for their entrepreneurial accomplishments. Casson continued to assert his observation by saying that specializing in good judgemental decisions in the coordination of scarce resources, possession of superior information and motivation to business creation is a personal attribute found in entrepreneurs. However, while these assertions may have significantly contributed to our current knowledge of the study of entrepreneurship, it is still not sufficient to explain entrepreneurship. The individual’s rationality is influenced by diverse factors and is not bounded as suggested by some literature.

Research in psychological entrepreneurship have centred on the personality traits of the entrepreneur(s) (Dvir et al. 2010; Bird et al. 2012; Ulhøi 2005) however, the problems that militate against this standpoint is that the concepts of the definitions of personality traits varied substantially in this literature. Stevenson et al. (1990) found some attribute missing in previous literature among successful and non-successful entrepreneurs which, suggested that characteristic traits were not universal. Philipsen (1998) in this concept defined entrepreneurship as a sequence of behaviours which may change over time.

Let’s draw illumination from the diagram below.
Figure 6.5: Personality Trait Dependency Network Diagram.

PT is derived as follows from the extraction in the figure above.
Let IQ = IQ, Persistence = Pers, Passion = Pass, Curiosity = Cur, Risk Tolerance = R/T,
Responsiveness = Resp, Creativity = Creat and Leadership Skill = L/S.

\[
P(PT) = P(PT_i) = P(IQ) \cap P(Pers) \cap P(Pass) \cap P(Cur) \cap P(R/T) \cap P(Resp) \cap P(Creat) \cap P(L/S)
\]

\[
P(PT) \text{ is a Bayesian likelihood of } P(IQ) \ast P(Pers) \ast P(Pass) \ast P(Cur) \ast P(R/T) \ast P(Resp) \ast P(Creat) \ast P(L/S) \ldots \ldots \exp 11
\]

6.3.9 Environment (EV)
This factor tries to capture the various possible economic and policy environments that
may prevail as an entrepreneur consciously and unconsciously works out veritable
opportunities that may exist or could be created given the circumstances.

To extrapolate this, this research closely looked at the Bayesian graph below and follows
up with the logical extraction of the likelihood of predictable possibilities within the
context under study.
Figure 3.6: Environment Dependency Network Diagram.

P(EV) as is dependent on P(Government) and P(Development) and P(Culture) and P(Economy) For the purpose of clear illustration, let Government = Govt, Development = Dev, Culture = Cul and Economy =Econ.

Therefore,

\[ P(EV) = P(Pol) \cup P(Dev) \cup P(Cul) \cup P(Econ) \]

\[ P(EV) = P(Pol) \times P(Dev) \times P(Cul) \times P(Econ) \ldots \ldots \exp12 \]

**6.3.10 Derivation of aggregate emergence**

Casson (2005) further argues that entrepreneurs need to possess an amount of traits in connection to decision-making in order to formulate a useful decision. While some of these qualities may be learned, others cannot be learnt like imaginations. Can we then infer that it is the mental characteristics that distinguish an entrepreneur from non-entrepreneurs? Since no one element is sufficient to explain entrepreneurship, an aggregation of these factors or elements will give more meaningful insight into the emergence of entrepreneurship.

Therefore, having derived the dependent variable factors from their independent sub-factors in the previous subsections, we shall examine how each one of the dependent variables contributes to the possible emergence of a hitherto non-existent or quiescent opportunity.

The partial contribution to emergence for each of the variable Probability (Emergence) is estimated to be 1/5 since there are five variables under investigation.
If we go further and apply the rules of dependence in conditional probability, we shall obtain the following eventually.

Note that, $Em$ is an abbreviation for Emergence.

Emergence given $TE$,

$$P(Em|TE) = P(Em) \cdot \frac{P(TEi)}{P(TE)} \ldots \ldots \exp13$$

Emergence given $PK$,

$$P(Em|PK) = P(Em) \cdot \frac{P(PKi)}{P(PK)} \ldots \ldots \exp14$$

Emergence given $PT$,

$$P(Em|PT) = P(Em) \cdot \frac{P(PTi)}{P(PT)} \ldots \ldots \exp15$$

Emergence given $EV$,

$$P(Em|EV) = P(Em) \cdot \frac{P(EVi)}{P(EV)} \ldots \ldots \exp16$$

Emergence given $SN$,

$$P(Em|SN) = P(Em) \cdot \frac{P(SNi)}{P(SN)} \ldots \ldots \exp17$$

By applying the conditional dependence in joint probability, and in the context of our Bayesian belief networks and probability, we shall have Probability of emergence ($Em$) given $TE$, $PK$, $PT$, $EV$ and $SN$ as below;

$$P(EEm) = P(Em|TE, PK, PT, EV, SN) \ldots \ldots \exp18$$

This can be translated into the expression detailed as follows;

$$P(EEm) = (Em|TEi) \cdot P(TE) + (Em|PKi) \cdot P(PK) + (Em|PTi) \cdot P(PT) + (Em|EVi) \cdot P(EV) + (Em|SNi) \cdot P(SN) \ldots \ldots \exp19$$
This research has utilised a qualitative simulation method for data gathering and analysis towards the prediction of entrepreneurial opportunity emergence through a Bayesian statistical probability model. A simulation method was considered more appropriate given the nature and kind of knowledge being explored in this study. Following findings from previous studies, it appears that static data will not give adequate light to this research as minimal variation in any given variable could trigger an avalanche of change in the ultimate output of the simulation which depicts human behaviours as their information changes especially entrepreneurs which are the focus of this work (Lorenz 2000). Therefore, the need to acquire a dynamic and an appropriate system and tool for data generation and processing suggested the use of a dynamic data generating simulation which is designed to mimic the exact responses expected from the focus group surveys and questionnaires collected for the purpose of comparative analysis.

6.3.11 How the Simulation Algorithm Works

The description of how the simulator works and the application of Bayesian prediction model to generate prediction data are only but an exemplary of the mechanism that runs in the background of the simulator towards generating the data used in the final analysis. Expression 18 to expression 22 are the functions of the joint and conditional probability functions that combines logically to concretize the conceptual model developed for this research. More information and details are given in the research design section.

**Probability of Prior Knowledge P(PK)**

\[ P(PKi) = P(Education) \times P(Experience) \times \ldots \times P(Initiative) \times P(Innovation) \times P(Invention) \times P(Research) \times \ldots \times \exp20 \]

Where \( P(PK) = P(PKi) + P(TE) \times P(EV) \times P(SN) \)

**Probability of Technology P(TE)**

\[ P(TEi) = P(Initiative) \times P(Innovation) \times P(Invention) \times P(Research) \times \exp21 \]

Where \( P(TEi) \) is expressed mathematically as \( P(Initiative) \times P(Innovation) \times P(Invention) \times P(Research) \)
Probability of Environment $P(EV)$

$$P(EV) = P(Government) \cdot P(Development) \cdot P(Culture) \cdot P(Economy) \ldots \text{exp}22$$

Where $P(EV)$ is expressed mathematically as $P(Government) \cdot P(Development) \cdot P(Culture) \cdot P(Economy)$

Probability of Social Network $P(SN)$

$$P(SNi) = P(\text{Income}) \cdot P(\text{Family}) \ldots \ldots \text{exp}23$$

Where $P(SNi)$ is expressed mathematically as $P(\text{Income}) \cdot P(\text{Family})$ and

$$P(SN) = P(SNi) + P(PK) + P(\text{Education}) + P(EV)$$

Where $i$ in all the expression implies initial condition

Probability of Personality Trait $P(PT)$

$$P(PT) = P(PTi) + P(TE) \ldots \ldots \ldots \ldots \text{exp}24$$

Where $P(PTi)$ is expressed mathematically as

$$P(IQ) \cdot P(\text{Creativity}) \cdot P(\text{Persistence}) \cdot P(\text{Leadership Skills}) \cdot P(\text{Responsiveness})$$

$$\cdot P(\text{Risk Tolerance}) \cdot P(\text{Curiosity}) \cdot P(\text{Passion})$$

6.4 Validity and Reliability Verification Methods

The methodology exploited in this research highly lay its validity and reliability credence to the comparative analysis deployed to check that the research design and the result properly relate to the traditional methods and that similarities were most certainly expected are visibly obvious to validate the simulation system employed. The findings show that without a doubt some variables examined as in the literature survey yielded a very similar result. The patterns observed in the graphic analysis and as seen from the simulation result and the questionnaires data totally agrees that entrepreneurial cognitive process that results in the opportunity discovery or creation is actually emergent and
simply complex.

6.4.1 Development of the Questionnaire and Coding of the Data

Statistical variable data were gathered through an online survey tool and free-response questionnaire. The exact questions presented to respondents are listed in Table 6.1. It is worthy of note to mention that, the questions were designed to address the central issue of predicting entrepreneurial emergence through Bayesian statistical probability and to test, through complexity approach, the conceptual framework presented in this research.

Table 6.1: Questions, Coding, and Responses for all the Survey/Questionnaire

<table>
<thead>
<tr>
<th>Questions</th>
<th>Coding</th>
<th>Total response per coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prior Knowledge is a contributory factor towards becoming an entrepreneur</td>
<td>1=Strongly disagree, 2=disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree</td>
<td>14 18 8 3 4</td>
</tr>
<tr>
<td>2. Technology know-how is a contributory factor towards becoming an entrepreneur</td>
<td>1=Strongly disagree, 2=disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree</td>
<td>16 17 8 3 3</td>
</tr>
<tr>
<td>3. Environmental influence is a contributory factor towards becoming an entrepreneur</td>
<td>1=Strongly disagree, 2=disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree</td>
<td>14 24 5 3 0</td>
</tr>
<tr>
<td>4. Personal and social network is a contributory factor towards becoming an entrepreneur</td>
<td>1=Strongly disagree, 2=disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree</td>
<td>6 17 11 6 6</td>
</tr>
<tr>
<td>5. Personality trait is a contributory factor towards becoming an entrepreneur</td>
<td>1=Strongly disagree, 2=disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree</td>
<td>10 22 7 6 2</td>
</tr>
<tr>
<td>Question</td>
<td>Rating Options</td>
<td>Values</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>6. Education is very relevant in the making of an entrepreneur</td>
<td>1=Strongly disagree, 2=disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree</td>
<td>11</td>
</tr>
<tr>
<td>7. The following attributes explain people’s tendencies toward becoming entrepreneurs, how much do these apply to you?</td>
<td>1=Not at all, 2=A little, 3=Somewhat, 4=A lot, 5=Completely</td>
<td></td>
</tr>
<tr>
<td>7a. Intelligent Quotient</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>7b. Passion</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>7c. Curiosity</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>7d. Leadership Skills</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>7e. Responsiveness</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>7f. Creativity</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>7g. Persistence</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>7h. Risk Tolerance</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>8. By how much does each of these influence you as an entrepreneur?</td>
<td>1=Not at all, 2=A little, 3=Somewhat, 4=A lot, 5=Completely</td>
<td></td>
</tr>
<tr>
<td>8a. Experience</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>8b. Education</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>8c. Family ties</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>8d. Friends</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>8e. Cultural Background</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>8f. Business Environment</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>8g. Government Policies</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>8h. Information Technology</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>9. Do you consider yourself to be a decision maker?</td>
<td>1=Not at all, 2=Occasionally, 3=Somewhat, 4=Usually, 5=Always</td>
<td>21</td>
</tr>
</tbody>
</table>

This research will be testing the conceptual framework model through the variables suggested in the previous chapter with further explanations provided in this chapter through a simulation system that rationalizes entrepreneurial opportunity as an emergent
system from complexity. The methodology used in this research is simulation technique which is socially constructed to fit our world designs and will be interpretative. Emergence, changes, and variations currently observed in the domain of entrepreneurship have been likened to a process similar to opportunity design mechanism. In this approach, the target solution to perceive challenge cannot be deciphered up-front having acknowledged the problems but instead; due to the fuzzy and complex nature of any definite solution, the desired outcome results from unfolding insight through the explorative process of designing solutions. Because the perceived problem may not be static in nature but evolving with the varying conditions, solution design is said to continuously change adapting to varying nature of the target problems thereby presenting a case of alternative solutions in the course of variations in the intermittent conditions of the problems. It becomes apparent that this practice is very comparable to the creation view of entrepreneurial opportunity emergence. This process identifies a gap in the entrepreneurial literature where the lack of dynamic and inventive views of emergent systems of entrepreneurship has not been adequately highlighted to match the present economic reality in the face of technology revolutions overwhelming our societies.

6.4.2 Data Generation Methods

The question in the fabrics of this research remains, how does entrepreneurship emerge in ever changing/dynamic economic and political environments? This research portends that, the acquired, adaptive learning and natural abilities of the individuals or groups involved in the search for opportunities are responsible for the creation or the discovery of solutions to challenging economic questions we call entrepreneurship. Data in this research is collected via two methods which are highlighted as follows;

<table>
<thead>
<tr>
<th>Attribute used in scaling the agent (entrepreneur)</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither agree nor disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

*Table 6.2: Description of the Likert scale for the simulation (Brown, 2010)*
Simulated Data: these constitute predicted responses of virtual entrepreneurs drawn from the questionnaire design and bounded by the Bayesian probability score boundaries as shown in Tables 6.1 and 6.2. The simulator which is designed using C-Sharp programming software is an automated questionnaire response carried out in groups of 100 entrepreneurs per run. And for the purpose of this research, 10 groups of 100 simulator respondents were used to trace the likelihood of a pattern emerging from the supposed simulated behaviours.

Survey Data: these comprise of 50 practicing entrepreneurs responses from across Nigeria who either filled a survey online or answered a hardcopy questionnaire designed as a replica of the simulator questionnaire for the purpose of comparative validation or otherwise of the simulator outcome.

6.5 Data Analysis

This research employs specifically the Bayesian statistical inference to model entrepreneurial behaviours. The entrepreneurial behaviours are qualitative in nature and required to be translated and measured in numeric terms in order to generate numeric data which is applied in the Bayesian methods for predictive evaluation and subsequent analysis.

To achieve that, I employ Likert scale to translate the qualitative entrepreneurial variables. Likert scaling in statistics is a technique for attributing quantitative value to subjective information, to make it friendly to the factual investigation. Likert scaling technique assumes that the quality or force of an experience is linear, i.e. on a continuum from a positive likelihood (strongly agree) to a negative likelihood (strongly disagree). It is designed to measure attitudes or opinions through levels of agreements or disagreements (McLeod, 2008). For example;

Likert scale example (Agreement).

5 – Strongly agree, 4 – Agree, 3 – Undecided, 2 – Disagree, 1 – Strongly Disagree.

Each selection on the scale is measured against the highest possible value which is 5 in this case hence; a measure of 3/5 implies undecided and 4/5 will mean agree (Brown, 2010). The scaling applied in this research does not have a middle neutral value as it will
not reflect the exact situation in reality since the researcher believes that entrepreneurs do not sit on the fence on economic issues. It is these numeric quantities that are imputed as data for Bayesian inference.

Literature shows that typical scientific theories are communicated through likelihood appropriations for observable experimental information (Kate et al., n.d.). These likelihood appropriations rely on uncertain attributes called parameters. In the Bayesian perspective, current know-how about the model parameters is communicated by putting a likelihood dispersion on the parameters, called the prior distribution, very often expressed as \( p(\theta) \) where \( \theta \) could be PT, PK, SN, TE or EV. When new data (\( y = \) education, experience, intelligent quotient, responsiveness, income, family etc. all elements of PT, PK, SN, TE, and EV) become accessible, the data they contain with respect to the model parameters is presented in the probability, which is corresponding to the distribution of the observed information given the model parameters, expressed as: \( p(y|\theta) \) an example which implies in context \( p(\text{education}|\text{PK}). \)

This data is then consolidated with the prior to yield an updated likelihood possibility often called the posterior distribution, which is the substructure on which all Bayesian deduction is founded. Bayes' Theorem, a basic personality in likelihood hypothesis, states how the upgrade is done mathematically: the posterior is proportional to the prior multiplied by the probability, or all the more definitely (Stern, 2001),

\[
p(\theta|y) = p(\theta)x p(y|\theta)
\]

which can be re-written as \( P(PT|\text{Education}) = p(\text{Education})x p(\text{Education}|PT). \)

There are numerous explanations behind embracing Bayesian strategies, and their applications show up in different fields. Numerous researchers support the Bayesian methodology in light of its logical reliability. Different central hypotheses demonstrate that if anyone needs to settle on predictable and quality choices even amidst vulnerability, then the best way to do as such is to utilize Bayesian techniques. Others point to consistent issues with frequentist techniques that do not emerge in the Bayesian system (Kate et al., n.d.).

Intense computational instruments permit Bayesian strategies to handle vast and complex factual issues without any difficulty, where frequentist techniques can just make rough estimates or fail completely. Bayesian modelling techniques give normal approaches to individuals in numerous fields of endeavour to structure their information and learning,
and they yield immediate and natural responses to the professional's inquiries.

There are numerous assortments of Bayesian examination. The extended rendition of the Bayesian worldview throws measurable issues in the structure of choice or decision making. It involves defining subjective prior probabilities to express known or existing data, cautious modelling of the information structure, checking and taking into account instability in model suppositions, articulating a set of conceivable choices and a utility capacity to express how the estimation of every optional choice is influenced by the unknown model parameters. However, the basic strand that underlies this variety is the essential guideline of utilizing Bayes' hypothesis and showing vulnerability about unknown parameters probabilistically (Eddy, 2004).

Certainly observation is a key element in this research project since it allows the researcher to witness the patterns of entrepreneurs’ behaviour. Although one might argue that any desired information could be obtained solely through interviews or surveys, it is important to note that people are often unaware of their own conduct, especially in practices and routines to which they have become accustomed to over time.

![Complexity Simulator front end view](image)

*Figure 6.7: Complexity Simulator front end view*
A close examination of Figure 6.7 above reveals a collection of subordinate variables which aggregate together to determine the value of the variable called Personality Trait in the context of this research project. Behind the simulator, is a system of conditional probability called Bayesian model. Within this model, the project suggests that IQ, Leadership skills, Creativity, Responsiveness, Risk tolerance, Curiosity, Passion, Persistence and others not considered aggregate through Bayesian prediction with the aggregate outcome totally dependent on the conditional values of each variable at any single point in time.

Each subordinate variable adopts a value from a range as presented in the Likert scale in Table 6.2. This selected value is only one amongst the range on the scale hence, the probability of selecting any single value from the Likert scale ranges is classified as the probable value of a subordinate variable at any given point.
In Figure 6.9, it could be seen that the overall outcome of prior knowledge-emergent value is conditionally dependent on the direct and consequent values of education and experience as well as other unknown (not considered) influences. The aggregation of these elements combines through a Bayesian statistical probability method to determine a value for the dependent variable.

![Complex Simulator for Social Network variable](image1)

**Figure 6.10: Complex Simulator for Social Network variable**

![Complex Simulator for Technology variable](image2)

**Figure 6.11: Complex Simulator for Technology variable**
Similar to the descriptions which were given for Figures 6.8 and 6.9, Figures 6.10, 6.11 and 6.12 also use the same Bayesian algorithm in determining the values of the dependent variables. All the elements vary simultaneously and independently to appropriately replicate a real system of human entrepreneur’s characteristic behaviours. Below is the description of how the simulator works to yield the results used in the analysis and in reaching the conclusions in the research. Figures 6.8 to 6.12 are a snapshot of the simulator designed to emulate Bayesian statistical probability and to predict outcomes based on values contained by each element of the main variable.

For proper illustration, here is a description of the process as seen in Figure 6.4. The simulator has completed 100 sequences already and has stopped at the 100th run in the snapshot as captured. The values generated in the elements fields are random and restricted to real values obtainable in a comparative questionnaire. The figure shows values as in the table below:

Table 6.3: Technology variable sub-element description

<table>
<thead>
<tr>
<th>Technology</th>
<th>Elements</th>
<th>Score</th>
<th>Probability</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiative</td>
<td>4</td>
<td>4/5</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>3</td>
<td>3/5</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Invention</td>
<td>1</td>
<td>1/5</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>1</td>
<td>1/5</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Others(Unknown)</td>
<td>1.157399764</td>
<td>Variable values</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Technology Emergent value</td>
<td>1.543199686</td>
<td>Bayesian expression output</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>
Table 6.3 shows an illustration of an instance of the simulator run for the Technology variable. The score is ranged from a value of 1 to a value of 5 in the strength of a probable outcome (refer to Table 6.3 for further clarification). The values generated as in Table 6.3 above is fed into the Bayesian expression as conceptualised and designed (in chapters 5 and 6) for prediction (see sample expression below;

\[ P(TE) = P(TEi) + P(Ed)). \]

The appropriate expression for the Technology variable is given as:

\[ P(TE) = P(TEi) + P(Ed) \text{ where Education is an influencing factor by spuriousity.} \]

However,

\[ P(TEi) = P(\text{Invention}) \times P(\text{Innovation}) \times P(\text{initiative}) \times P(\text{Research}) \times P(\text{Unknown})/ (P(\text{Invention}) + P(\text{Innovation}) + P(\text{initiative}) + P(\text{Research})) \]

This is then translated into \[ P(TEi) = 1 \times 1 \times 3 \times 4 \times 1.157399764/9 = 1.543199686. \]

### 6.6 Synthesis

This research project proposes a systematic paradigm of predictive modelling as an alternative to other existing qualitative explanations; one that could help in enhancing entrepreneurship practices. This paradigm is derived from the theoretical and empirical literature. The model derives its scenarios from known variables based on a Bayesian prediction model to help trace possible emerging trends or pattern from the data collected through primary methods and compared to simulations.

This concept of emergence patterning may appear unexpected. Nevertheless, if both simulations and qualitative data collected demonstrate a consistent pattern, they then invite comprehensive and careful examination. Features in this pattern can lead to the prediction of subsequent possibilities, although these predictions may be empirical and so not explicitly accurate.

Figures 7.50 – 7.58 in the following Chapter 7 demonstrates an emerging interactive trend apparent in business people as they take part in social, behavioural and financial activities of learning suggests Rae (2006). This perception proposes that, while entrepreneurial instruction is great and gainful, the demonstration of the enterprise is
found out mostly in the business situations through social, enthusiastic, useful and inductive encounters. In this manner, entrepreneurial learning is procured through an exceptionally dynamic procedure of mindfulness, reflection, affiliation and application that includes changing background and know-how into functional results.

The outcome of the analysis from the previous chapter of data analysis suggests to a great extent that, entrepreneurs may not be effectively predicted at a specific instant but a calculated and ordered observation of persons and(or) groups trends reveal more about these possibilities. It is a feature of complex systems that individual sets of events (initial conditions) cannot be generalised, but that general scenarios (limit cycles) can be formulated that model the processes where human (entrepreneurs) minds are constantly evolving and changes happen through heuristics or observation of economic trends and the active agents responses.

In this study, the search for emergent patterns reveals that the continuous evolution in Technology, Society and interaction styles, personalities, character tendencies and the varying environment have shown a significant effect in the current trends seen in entrepreneurship.

6.7 Modelling Computer Simulation in Entrepreneurship

Computer simulation modelling is a discipline gaining recognition in both government and industry. It can be very useful by aiding in the planning, formation, and evaluation of intricate frameworks. Architects, program administrators, analysts, and specialists use Computer simulation demonstrations to comprehend and assess 'what if' case scenarios. It can show a genuine or proposed framework utilizing computer programming and is helpful when modifications to the real structure are hard to actualize, or involves high costs, or are unfeasible. A few cases of computer simulations and modelling are recognizable to a large number of us, which include: weather forecasting, pilot test programs utilized for training pilots, and car crash modelling. These modelling can be Discrete Modelling where changes to the framework happen at particular times, Continuous Modelling where the condition of the framework changes constantly after some time or Mixed Modelling which contains both discrete and persistent components inside of it (Taylor and Robinson, 2006; Robinson and Taylor, 2004).

Breaking down the distinctive sorts of simulation samples introduced, it can be understood that the vast majority of these models regardless of whether they were
discrete or non-stopping in nature comprised of genuinely expanded model on which a fairly straightforward investigation was performed. The standard procedure in the course of this simulation experiment was as follows; starting with an initial set of initial conditions which are chaotically (randomly) generated, the observed changes in the variables of the model is recorded. The variables are evaluated on a defined prediction scale with all generated values stored up in an array of excel sheets for further analysis and comparison with primary data statistics (Naim, 1996). In this research, entrepreneurship is perceived as a complex, complicated and chaotic phenomenon which defies straight approach to its emergence hence, to enable its explanation, abstract model of a possible method of occurrence is built through inductive observation of real characters (entrepreneurs) which exhibit this phenomenon.

6.8 Simulation Basic Concepts

The integral building concepts in this research simulation include the Object, the Base Model, the System and the Experimental Frame.

The Object; this is a real-world entity that is mimicked in experiments. It represents the entrepreneurs. Because the object exhibits a wide array of varying behaviours, this study limits the scope of mimicking to the context in which it is being studied. This means only the relevant characteristics which are capable of describing the conceived model is considered and used as is shown in the conceptual framework. Nevertheless, the main variables were extracts of leading and broad literature on the subject matter and are simple characteristics of a human person called an entrepreneur.

The Base Model; this is the conceptual representation of the objects characteristics, especially its conduct which is legitimate in every single conceivable connection and depicts the item's basic parts. One could ask if truly a base model exist. Since it is almost impossible to totally represent the object model in practice, the base model is considered to be hypothetical. Therefore, the answer to the question whether a base model exists at all is a philosophical one.

The System; is viewed as a definite entity in the real world under specific circumstances which only considers relevant and precise features of its existing structure and evolving
behaviour. What really is this system behaviour connotated? It is the capacity of mental, physical, enthusiastic, and social exercises experienced by individuals in life which integrate the activities as orchestrated by societal norms, society, values, beliefs, morals, and innate qualities. It likewise can be seen as the scope of activities and idiosyncrasies communicated by people, organisms, frameworks, or manufactured substances in conjunction with themselves or their surroundings, which could be the (lifeless) physical environment. It is the reaction of creature to different stimuli or inputs, whether interior or exterior, cognizant or concealed, evident or vague, and intentional or unintentional. The actions actually refer to personality traits, prior know-how (knowledge), technological know-how, social networks and entrepreneurial environment.

**Experimental Frame;** this refers to the experimental conditions and contexts within which the study of a real world system is confined in order to make sense of its behaviours. It is designed to a specifically conceptualised model that reflects the objectives of the experimentation or simulation.

![Behavioural Model for Entrepreneurial Emergence](image)

*Figure 6.13: Behavioural Model for Entrepreneurial Emergence*

It is important to explain the concepts of modelling and experimentation (simulation) as applied in this study. The research suggests that, a simulation which imitates this present reality (activity) can be seen as virtual experimentation which permits one to clarify questions about the behaviour of a system. The particular technique used in achieving this does not matter in so far as system’s behaviour is comprehensively explained. But the primary goal of this modelling is to expressively depict a framework exhibiting data in a justifiable and re-usable form. Simulations ought to be fast and accurate with the ability to perform all kinds of modelled behaviours to ascertain all possibilities feasible in
Very fundamental to the system - simulation (experiment)/model – virtual testing scheme is that there is a congruous correlation between model and structure. Creating a model of a real system and consequent simulation of its behaviour is expected to yield the same results as running a real experiment accompanied by observing and classifying the experimental results. Because it is a tool for achieving a conceptualised goal, one fundamental requirement is to have some degree of the assertion that interference associated with modelling and simulation can be accepted with self-assurance. This assurance is established through some generally accepted mechanisms namely verification and validation. Our validation mechanism employed in this research work involves a comparative analysis of simulation results with primary data. The variations observed in the analysis of the results accurately demonstrated the emergent behaviour anticipated. This further suggests that entrepreneurship scholars should graduate from the linear structured study of entrepreneurship behaviours to a nonlinear approach that will carefully capture the complexities in the attributes of the personality. Human characteristic behaviours are complex and most times unpredictable hence, linear study focussed on simple cause and effect does not suitably explicate the phenomenon.

While Verification is totally concerned with the procedure of checking the consistency of a simulation program concerning the complicated model out of which it is derived. It is centred on the correctness of the transformation of the Object in the simulation from an intermediate dynamic representation (conceptual model) to the project code (Bayesian simulation model) in this manner guaranteeing that the system code accurately mirrors the activities that are certain in the applied model specification.

Upon completing the verification, it becomes very necessary to perform a validation process on the simulation experiment. This process entails comparing questionnaire analysis results with simulation results, even though increased concurrence does not demonstrate the validity of the model, however. In a case of obvious differences in the comparison, it may imply that the formal model built does not reflect the real system. It is fundamental to understand that a single mismatch between comparative measurements (Bayesian simulation results and questionnaire data analysis results) does not invalidate the model, but will rather cause a falsification of the results.

The ideology of this research work holds that the notion of general linear and reductionist
approach to entrepreneurial behaviour is not adequate to explain the emergence observed in the behaviours and decision-making processes of entrepreneurs but instead, a more pragmatic complex method is more adaptable hence, the adoption of complex system methodology in the form of ‘Simupreneurship’.

<table>
<thead>
<tr>
<th>Table 6.4: The conceptual variations between Reductionism and Complexity in system</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General linear notion</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

6.9 Simulation description

In philosophy, systems theory, science, and art, emergence is a procedure whereby bigger elements, examples, and regularities emerge through collaborations among miniature or less difficult substances that themselves do not display such properties. Such substantial scale (large scale) designs that emerge out of the collaboration of various associating (small scale) agents are called emergent phenomena that are, patterns that rise up out of connections at a lower level or scale.

Emergence is focal in theories of integrative levels and of complex frameworks. For example, the occurrence of life as considered in biological science is normally seen as a new property of connecting atoms as examined in chemistry, whose emergence reflect communications among rudimentary particles, modelled in molecule material science (particle physics), that at such higher mass by means of significant combination show movement as demonstrated in gravitational material science. The neurobiological trend is regularly attempted to suffice as the basic phenomena of mental experience, whereby financial events are thusly presumed to primarily develop thereof (Stewart 1922; Bandura 2002; Klyver and Schøtt 2011).

In order to grasp this research work, the researcher has implemented an observable behaviour of entrepreneurs as agents in a Netlogo simulator. More elaboration of the simulator is given below.
Within these simulations, prior knowledge, environment, social network and personal
drive were translated into simulation logic which then enables the agents (entrepreneurs)
to exhibit this quality at its (their) discretion. The agents were programmed to exhibit
free will but with some sense of purpose and so, whenever in an area (patch) or perceive
any elementary characteristics, they are subject to act accordingly due to their personal
drive to attain entrepreneurial success.
As knowledge and self-confidence grow, the agents within the confine of the simulator
were observed to break away and form a new centre of attraction for other agents which
aspire to attain entrepreneurial height. There could be other factors not included in this
simulator which could allow for further exploration in advanced research of the topic but
for the purpose of this ideology (entrepreneurship as complex emergence) evaluation.
The present set up was considered sufficiently adequate for theorizing and simulator
evaluation of entrepreneurship emergence using Bayesian statistical probability and
logic.
First and foremost to notice is that the agents are represented in the shape of humans to
depict entrepreneurial agents and each agent heads in whatever direction it desires
although within the confines of the bounding flocking rules set up. The set-up button is
used to initialize the simulation during which the agents are randomly placed in the
window panel after set-up button has been clicked. While the set-up button creates and
initialises the agents, the go button functions as to run (start/play) and to pause the
system. The sliders Business-men and Entrepreneurs are utilised to create up to 2000
and 1000 agents at initialization respectively. As the simulation runs upon initialization,
the Vision slider is used to set the distance an agent can see in all direction which means
the scope of an agents’ insight. Information-centres refer to patches that have hosted an
activist entrepreneur for a lengthy period and have changed its colour from plain black to
green. Any agent that comes on these green patches and dwell long enough will by
inducement assimilate knowledge and subsequently grows and transition from one level
of entrepreneurial know-how to the next until it attains an activist status. The info-centre
slider is used to vary the number of institutions of knowledge either automatically at
start-up of initialization or during re-run to measure performance by other parametric
settings. It is very necessary to state that in this section, agents are used interchangeably
with entrepreneurs as both represent the same entity as in reality and in the simulation.
Given that there are many possible implementations of the simulation under description,
how then can one choose which settings to use?
The Figure 6.14 is a view of the control dashboard used in the simulation demonstration of the dynamic scenarios in Netlogo. Each button’s function is briefly described below:

**Business-Men (Agents):** these are the abstract representation of potential entrepreneurs within the simulator environment. They are called turtles and they are like robots which can be programmed to carry out certain actions based on definite logical events or occurrences. Although NetLogo has its programmable back end, the essence of the simulation was to have a logo (pictorial) view front end for ease of demonstration, teaching and learning of phenomenon under study. In this research, I mimic real humans who normally embark on economic activities termed entrepreneurship.

**Setup:** This is the initialization button which tends to push the programme into buffer or RAM (random access memory) for implementation. It implements an initial static posture of the artificial universe were in the agents will act.

**Go:** This is equivalent to start/play and stop button found in regular computer devices and software. It activates the software codes.

**Clear-turtles:** This is the button that removes all agents from the display universe leaving behind its trace paths, effects (i.e. this refers to the impacts the agents make in its universe and on other comrade agents).

**Clear-trace:** This is the button that removes all agent-traces (route walked) from the display universe leaving behind the agents and their effects (i.e. this refers to the impacts
the agents make in its universe and on other comrade agents).

**Clear-patches:** This is the button that removes all agents’ achievements from the display universe leaving behind the agents and trace paths (i.e. the route walked by the agents). The area of coverage in the simulation panel is defined by patches.

It is necessary to know that, Alignment, Separation, and Cohesion are all calibrated and set up in degrees to make room for angular displacement.

**Minimum separation:** This refers to the minimal distance between at least two agents in order to avoid overcrowding or collision. This is calibrated in the degrees to allow for angular distance.

**Maximum Separation turn:** This means that the agent will turn to steer clear of another agent which gets too close, however, although this will be done by the agent willfully, the rules of separation will allow for a maximum possible shift in order for the agent not to amble away from the concentration of entrepreneurial information.

**Maximum alignment turn:** Just like it is with flocking birds, most entrepreneurs will ensure they remain within the ambit of information whether new research, conferences or innovations to enable them sustain within the increasingly complex entrepreneurship enclave and expectation. Alignment, as used in this simulation, points to the unconscious yet conscious attempt by agents to follow the lead of other informed agents within their network of operation or activities. Maximum alignment turn sets the limit to which the agent can head away from the lead of others or turn to be in accord with them.

**Maximum-Cohere-Turn:** Cohesion here describes the tendency for an agent (entrepreneur) to move closer towards another agent that is within its network. The maximum cohesion turn defines the tendency for agents to affiliate themselves to others.

**Vision:** Also like can be seen with birds, vision here defines the physical and mental scope of coverage (i.e. how much foresight an entrepreneur has when engaging in any activity).

**Non-usage limit:** This slider is very important in the building logic that decides how the agents grow in their search for know-how and in some cases loose knowledge due to
redundancy or inactivity. It sets the duration of time in weeks during and wherein if the agent does not interact with another with higher knowledge gradient or at least an information centre, it begins to lose know-how and consequently experiences a decline in entrepreneurial knowledge which gradually strips the agent of its capacity to advance to an activist entrepreneur. With this consciousness, the agents navigate the artificial universe making efforts to attain a higher entrepreneurial status as defined or graded within the confines of this study.

**Information Centre:** For agents to grow, they needed to exchange information or knowledge. This knowledge refers to all necessary skills, learning, instructions or capacity to make informed decisions. This could result from agent to agent interactions or institutions of knowledge which are called information centres in this research. They appear as green patches in the simulation panel.

**Activist entrepreneurs:** These are agents that have attained sufficient entrepreneurial height/status which enables them to influence their immediate environment. In so doing they transfer knowledge to other agents in their vicinity and also produce institutions of knowledge in the form of ventures, businesses, firms and organizations in general. These institutions of knowledge appear as green patches in the simulation panel. The activist entrepreneurs appear as red agents in the simulation panel.

**Well-informed Entrepreneurs:** These are the intermediate agents which have gained substantial information and are next to the activist agents. They appear as blue agents in the simulation environment and they are usually the product of the transition of aware agents (entrepreneurs) upon attaining a definite information level. They also result from the reverse transition of the activist agents due to decline in know-how.

**Aware Entrepreneurs:** These are next to the well-informed entrepreneurs (agents) and result similarly from the knowledge decline in the well-informed agents and ascension from the lay agents also known as the unaware entrepreneurs. They appear in the simulation as yellow agents and in the context of this study, it is the stage at which individuals decides to take on the daunting task of becoming an entrepreneur. It could also be perceived as entry level for the agents who have made the choice of pursuing an entrepreneurial adventure.

**Unaware Entrepreneurs:** there is the class of agents otherwise called lay agents who are
They are defined in gray/ash colour in the simulation window and are referred to as the lowest level of information bearing agents. They usually constitute the majority of the agents within the simulation window but as they gather information, they advance and transition through the hierarchy to become activist entrepreneurs.

The NetLogo world is comprised of operators (agents). They are artificial creatures that can take on directives/instructions. Every operator can complete its own particular action and all at the same time. In NetLogo, Turtles are operators that move around on the virtual universe (earth). The world is two dimensional and is dissected into a matrix of patches. Every patch is a square bit of ground over which turtles can move. The onlooker does not have an area; consequently, it can be envisioned as watching out over the universe of turtles and patches. The universe of patches is not limited, and so wraps around, so when a turtle moves past the edge of the world; it vanishes and returns on the inverse edge. Each patch has the same number of neighbour patches if there is a patch on the edge of the world; some of its neighbours are on the inverse edge (Wilensky, 2000).
6.10 Autonomous nature of entrepreneurship

An articulate and organised observation of the results of the simulations both the static Bayesian model and the dynamic Netlogo simulator implemented to enable the graphical observation of behaviours shows a drastic shift from the organised and planned nature of entrepreneurship as abundant in the extant literature. Emergent system characteristics observed in the evaluation suggests a behaviour which is in tandem with the postulate of ‘deferred action theory’. The eventual behaviour which is hitherto not perceived or recognised within the entrepreneurial pursuit’s initial plan demonstrates an evolving behaviour of an entrepreneurial system. Most actions taken in the process of entrepreneurship pursuit emerges from participatory involvement in the process.

It is imperative to note that business persons continuously evolve in their cognitive thinking and decision-making processes as they increasingly acquire knowledge and more information about their business environment. This dynamic interplay that continuously readjusts the disposition of the individual entrepreneur is perceived in this study as emergence. The intermittent states of the personalities during the process could not have been deciphered from the beginning of the pursuit or engagement. Therefore, this research conforms to the theory of differed action as a suitable systematic explanation that captures the phenomenon. The graphical information in Chapter 7 (Figures 7.50 to 7.58) which illustrate patterns that totally kowtow to differed behaviours where the disposition of agents is continuously changing which also cause the planned action to be altered to suit the new information thereby achieving a suitable end rather than the planned action.

Hanneman (1995) and referred to in (Hanneman and Patrick, 1997) conjecture that, simulation techniques include the production of models, comprehending the behaviour of the models by method of experimentation, and assessment of the degree to which the conduct of the models gives a conceivable record of the conduct of observed normal frameworks (Hanneman and Patrick, 1997). Integral to the methodology is the model. For our reasons here, we might think about a model as an artificial agent or object (particularly, a computer program for example, ‘Netlogo’, ‘Bayesian Statistical Prediction Automated’) that is theorized by the scientist to give a conceptual representation of a few parts of social structures and processes (Gilbert 2004; Naim 1996; Hanneman and Patrick 1997).
The exploration procedure is model reliant. Having designed a computer program that epitomizes the standards of a hypothesis in some reasonable way, I now utilize it to make particular forecasts about situations for which I can gather information by different means. Introductory conditions inside of the model are currently set to be indistinguishable to those in normally occurring instances of the phenomenon under study and the model is re-enacted. The simulated information is contrasted with information emerging from the perception of the common framework (actually happening, semi-tested or exploratory). Assuming that the similitude/match is poor (as it regularly seems to be), we should rest on the conclusion that there has been a failure (Eze et al. 2012; Grossberg 1988).

The Functions of Simulations and reason they are run in sciences.

1. Simulations as a procedure: Investigate the definite progress of a framework.
   One noteworthy favourable position of simulations is that they permit researchers to investigate the point by point processes of a genuine procedure. As a rule it is unrealistic for down to business motivations to produce this data tentatively: the pertinent time scale ends up being either too extensive (e.g. for the advancement of systems) or too little (e.g. for atomic responses) (Hindle and Yencken 2004; Pincus 1991).

2. Simulations as a heuristic apparatus: Develop speculations, models, and hypotheses
   Simulations assume an imperative part during the time spent creating hypotheses, models or even new theories. Investigating the after-effects of a lot of run-times of a simulation model with various parameters might propose new and basic regularities that would not have been drawn out from the model assumptions generally. Some of these theories can, thus, serve as fundamental presumptions of, say, a simpler model (Wilensky 2000; Anon n.d.; Naim A. Kheir 1996).

3. Simulations as a substitute for an analysis: Perform numerical tests
   Computer simulations these days constitute a fundamental device to bolster genuine analyses. These are the predominant undertakings:
   i. Inspire tests
   ii. Preselect conceivable frameworks and setups
   iii. Analyze tests
Simulation triggers experiments when another consistency or speculation has been found by investigating the after-effects of simulation for a wide range of parameter sets. It is then worth standing up to this speculation with a genuine examination. Artificial modelling serves to preselect conceivable frameworks and setups for practical reasons. It is essentially excessively troublesome, making it impossible to discover the parameters that show the impact experimenters are searching for most unmistakably in a genuine investigation, particularly in expense (and time) costly high-vitality material science. Then point by point models of conceivable test setups and game plans are performed before the real trial is executed. Simulation breaks down examinations when trifling or surely known impacts must be subtracted all together to make the genuine impact obvious. Simulation models frequently turn out to be helpful for recognizing these variations (Vanpaemel n.d.; Hartmann 1996).

4. Simulations as a pedagogical device: Gain comprehension of a procedure
Simulations turn out to be greatly valuable in training students. By playing with an artificial model and imagining the outcomes on a screen, learners build their comprehension of the fundamental procedures and add to an instinct for what may happen in comparable circumstances. Learning things along these lines is both much less expensive and faster than performing genuine trials (Kneebone et al. 2007; Duggan 2015; Cadotte n.d.; Sonnessa 2004).

6.11 Conclusion
Upon an overview of previous research works, learning is conceptualized as one vital measurement of emergence that comprises of both implicit and express sub-measurements (Davidsson et al., 2003). A noteworthy collection of studies focuses on the particular training needs of early business visionaries.

In any case, here, the exploration concentrates on the plausible co-operations that will bring about something other than what’s expected (emergence) and valuable as an answer for an entrepreneurial need. This implies that, as variables join in co-operations and sense making within the mind of an entrepreneur, the individual or group’s alertness for comprehension tunes for clear reception. As the ability and experience builds, the entrepreneur’s knowledge and belief system develop and in the long run burst into a new idea which we could just portray as emergence or an invention.
Chapter 7: Research Data Analysis

7.1 Data Analysis

*Albert Einstein (n.d.) once said: If you cannot describe it simply, you do not understand it well enough.*

7.2 Introduction

It is necessary to clearly state the unit at which analysis was done in this project in order to establish the concepts and basis for the analysis. While literature and researchers abound that continuously disagree on what unit of analysis is more appropriate for entrepreneurship research, this project has chosen to evaluate entrepreneurship at the level of the individual initiators, their motivations and influences. Other levels include such aspects as firm level, industry level or regional level, while it is also thought that entrepreneurship can be viewed at those levels, it is also pertinent to say that there ought to be an existing foundation before these levels hence this research considers these levels that has been obviously investigated in the literature as higher levels which tend to emerge or evolve from the lower and basic level as this study examines.

An inherent feature of complex systems is that they are so dependent on initial values that even small differences in these initial values result in significant divergences after operating for a time. However, repeated simulations can reveal the attraction surfaces for these systems, if, of course, these attraction surfaces exist, and, in any case, help our understanding of the underlying mechanics and possible outcomes. A simulation sample data for 1000 entrepreneurial occurrences is selected to illustrate interactive and contributory behaviours of the five features (Prior-Knowledge, Social Network, Environments, Personality Traits and Technological Know-how) as conceived in the conceptual framework for the purpose of demonstrations. Also, fifty research questionnaires were distributed and collected from actual practising entrepreneurs in Nigeria to serve as comparative control data for the simulation results.
In this segment, the results of data analysis are presented. The information was modelled and simulated, assembled and after that arranged in light of the project questions examined in the first chapter. The principal objective that guided the gathering of these sets of data was to trace and determine the patterns in entrepreneurship emergence (as is evident in the dynamic entrepreneurial proliferation all around our societies and) also, to simulate this using a virtual society peopled by virtual entrepreneurs who emulate natural behaviours of entrepreneurs as detailed in the literature. The objectives were achieved. The findings submitted in this section express the potential for emerging assumption and practice of 'Simupreneurship'. Simupreneurship is the researcher’s terminology for explaining the study of entrepreneurship using simulation techniques.

Literature in the past identifies with how entrepreneurs process data uniquely (Mitchell et al., 2000) however, it does not take care of the case of how human data management controls entrepreneurial opportunity recognition-discovery or opportunity construction-creation. Since the interactions and intra-actions of certain factors within this research bring about the emergence of opportunity, the technicalities of this relationships will be further explained in order to demonstrate this idea and to clarify the procedures that create emergence.

First, the five variables Prior-Knowledge, Social Network, Environments, Personality Traits and Technological Know-how were operationalized. In order to verify their validity outside the academic literature, surveys and questionnaires were given out to 50 entrepreneurs in Nigeria in various fields of entrepreneurial endeavours ranging from manufacturing, construction, IT services to tailoring, catering, and entertainment businesses. Their responses are clearly shown below each variable in the following sections. The conclusion was drawn that there was a valid argument to consider these variables and so they were adopted as the foundation of the simulation and analysis of the simulated data in this project research.

7.3 Analysis of Response to the Variable Prior Knowledge

The prior knowledge possessed by an entrepreneur is a fundamental key to recognition of emerging new opportunities.
It could be argued that prior knowledge is fundamental to the development of an entrepreneur; alternatively, prior knowledge could be considered inconsequential. The balance of the scholarly writing tends to favour the significance of prior knowledge but, with a specific end goal to substantiate the discoveries in the review, an online survey, and a questionnaire tool was used for a focus group of fifty (50) Nigerian entrepreneurs with forty-seven (47) successful respondents. This implies 94% successful response. The result of their responses is indicated in the Figures following.

**Figure 7.1: PK responses by percentage**

Using the scale outlined for this research method, the data in Figure 7.1 shows 14 (29.79%) and 18 (38.3%) of the 47 respondents strongly-agreeing[5/5] and agreeing[4/5] with the argument respectively. Because these responses are measures of their beliefs, one can say that of the 47 respondents, (14+18=32) entrepreneurs agree with the statement. By percentages, this amounts to (29.79+38.3=68.09%), which translates to the probability of respondent agreement as Pr=(0.689), this is a high percentage.

**7.4 Analysis of Response to the Entrepreneurs’ Personality Traits**

The entrepreneurs’ disposition (Personality trait) is a contributory factor to how they will respond to an invisible (latent) opportunity

Here, the same fifty participating entrepreneurs responded on the notion that personality trait in an individual or group evidently influences their tendencies towards
entrepreneurial accomplishments. While still only forty-seven responses were collected, the result is reflected in Figure 7.2 below.

![Image](image.png)

**Figure 7.2: PT responses by percentage**

From the graph, it appears that 10 (21.28%) and 22 (46.81%) convincingly agree in favour of this variable at the level of strongly agree and agree respectively. If it is measured through the research belief methodology, I can state that (21.28+46.81=68.9%) or Pr= (0.689) of the respondents believe in this variable as vital in the process of entrepreneurs’ emergent development process.

### 7.5 Analysis of Response to the Social Network of Entrepreneurs

The social network of entrepreneurs to a large extent influences their thoughts and perception about the immediate environment and how to recognize trends that give rise to opportunities given their social circle or network.

The argument continues among scholars about the effect of social environment and a network of entrepreneurs in their quest for success as entrepreneurs. While this has continued, the need to obtain empirical supporting evidence led to the inclusion of this question in the survey/questionnaires which was asked of fifty (50) entrepreneurs for a response. Although forty-six (46) of those responded, here is a distribution of their responses in a bar-chart format in Figure 7.3.
From Figure 7.3 it can be clearly observed that 6=13.04% and 17=36.96% clearly favour this variable by ticking strongly agree and agree respectively. This implies that 6+17=23 of the 46 responded positively and on aggregate 13.04+36.96 = 50% for.

### 7.6 Analysis of Response to the Entrepreneur’s Business Environment

The environment is a key determinant of the types of opportunities that avails whether latent or readily identifiable. Therefore, opportunities emerge to suit the prevailing economic, social and development level in the hosting environment.

It seems intuitive that, the environment contributes to the mindset of an individual. For instance, people are distinguished all over the world by such characteristics as languages, culture, accents, a disposition to living itself, gender and skin colour. Entrepreneurial environments output different entrepreneurship activities which suit the prevailing conditions within the surroundings.
From the graph in Figure 7.4, it follows that 25 (53.19%) and 14 (29.79%) realistically agree in favour of this variable with an overwhelming choice of strongly agree and agree respectively. If it is measured through the research belief methodology, I can state that \((53.19 + 29.79 = 82.98\%)\) or \(Pr = (0.8298)\) of the respondents purposefully believed in this variable as vital in the process of entrepreneurs emergent development processes.

### 7.7 Analysis of Response to the Variable Technology

Technology is the bane of present economic development. Hence, it assumes a key part in the type of opportunities that emerge and the sense of perception that creates it. Because of the dynamic nature of technology, an entrepreneur with variable knowledge of technology know-how could easily recognize or perceive opportunity gap in the system differently. Therefore, if one is given to technology, there resides the capacity to create a hitherto unknown opportunity and probably recognise a rather veiled possibility.
The graph in Figure 7.5 displays the divergent beliefs of entrepreneurs about this variable. It shows that 16 (34.04%) and 17 (36.17%) convincingly agree in favour of this variable in the capacity of strongly agree and agree respectively. If the presented data is expressed through the research belief methodology, I can state that (34.04+36.17=70.21%) or Pr= (0.7021) of the respondents jointly believed in this variable as vital in the process of entrepreneurs emergent development process.

Although few variables were considered in this research, there could be many other variables that researchers may consider important or even more appropriate. These chosen variables were carefully selected and their importance is supported by the numerous academic literature reviewed. These surveys provide empirical validation of the choice of variables, and it can be deduced that these variables do influence diverse entrepreneurs differently. Following the concept of Bayesian network model as described in Chapter 6, these hypothetical variables were presented as being offspring of parent sub-variables.

Hence, it becomes feasible that upon further research, additional or new variables could be set-up using the same methodology and concept for evaluation of the ideas presented in this thesis. It is very vital to make sure that the data captured, generated and collected for analysis reflects the beliefs of the entrepreneurs and not the researcher’s subjective observations. Certainly, static data observations limit the extent to which research results could be generalized, because the analysis is based on available data. The Bayesian data
model allows for conditional sets, facilitating the employment of terms such as “if”…, “if… Then” and “if…. Then… else”, which in turn leads to a conclusion in logical terms. However, Bayesian analysis has those who dispute its usefulness and applicability, and it is possible that the validity of this research result might be contested for similar reasons.

7.8 Emergent Pattern Analysis

It is very simple for any individual to differenciate the vocal sound of a person’s voice from that of a violin; a transcribed number ‘3’ from an ‘8’; and the smell of a rose as against that of an onion. In any case, it is possible for a programmable computer to take care of these sorts of non-cognitive issues. These issues are troublesome in light of the fact that every pattern contains a lot of information, and the recognition issues ordinarily have an unnoticeable, high-dimensional structure.

Pattern recognition is the discipline of carrying out deductions from non-cognitive information, utilizing devices from statistical analysis, probability, computational geometry, machine learning, signal processing, and algorithm design. It is crucial and of central significance to artificial intelligence and computer visualisation and has sweeping uses in engineering, science, medicine, and business. Specifically, research progress made amid the last ten decades now permit computers to associate more adequately with people and the normal world. This can be found in speech recognition or optical character recognition software. Nonetheless, numerous critical issues in pattern identification are yet to be resolved.

It is sensible that we try to plan and build machines that can understand patterns. From programmed speech identification, fingerprint distinction, optical character acknowledgment, DNA arrangement identification, and a great deal more, it becomes obvious that dependable, precise pattern recognition with the aid of machine would be massively valuable. Besides, in illuminating the inconclusive huge amount of issues necessary to construct such systems, we increase more profound comprehension and expediency of pattern recognition systems. For some issues, like voice and optical recognition, the design endeavours might actually be impacted by knowing how these are worked out in nature, both in the algorithms we utilize and in the configuration of special-purpose hardware.
7.9 Comparing Data from Survey Group against Simulation

An attribute will be thought to be any particular aspect, quality or characteristic which can be symbolic and may be given a numeric value, like colour or height. The combination of a few features say (Δ in number), is shown as an ordered column set, termed a characteristic vector. The Δ-dimensional space characterized by this vector is referred to as feature space and objects are shown as points in feature space (Anon n.d.).

A pattern is described to be combination of characteristics that are an attribute of a person. In categorization, a pattern is an arranged pair of variables \{x,y\}, where x is a group of observations or characteristics (feature vector) and y is the idea driving the observation (label). The nature of a feature vector is identified with its capacity to differentiate instances from various classes. Graphs, known as scatter plots, may be drawn of Y against X. Figure 7.6 through to Figure 7.15 have scattered plot traces of pattern from the data collected from the ten groups of entrepreneurs simulated and each compared with field (Survey) data. It is important to observe the line of best fit which tries to illustrate the correlation between the field data and the simulation data. A more detailed explanation is provided in Figure 7.16 below.

![Figure 7.6: Trends in entrepreneurs in group one](image)

The trend's line in group one plot in Figure 7.6 above shows a regular incremental pattern at the point where the aggregate probability of the group is above average (0.5). We shall observe the rest of the Figures 7.7 to 7.15 to study the trend line and ascertain if
Figure 7.7: Trends in entrepreneurs of group two

Figure 7.8: Trends in entrepreneurs of group three
Figure 7.9: Trends in entrepreneurs of group four

Figure 7.10: Trends in entrepreneurs of group five

Figure 7.11: Trends in entrepreneurs of group six
Figure 7.12: Trends in entrepreneurs of group seven

Figure 7.13: Trends in entrepreneurs of group eight

Figure 7.14: Trends in entrepreneurs of group nine
Analysis of the graphs in Figures 7.6 to Figures 7.15 reveals a bounded variation in the pattern trends observed, showing that there are differences. On the other hand, there is significant similarity demonstrated between the graphs, suggesting a corresponding similarity between the characteristics of entrepreneurs. It can, therefore, be deduced that the detailed characteristics of entrepreneurs are different nevertheless it would seem that they share their general ideology and philosophy. This, in turn, leads to the view that there may be no converging uniqueness stereotype of an entrepreneur, however the existence of decomposition into several classes which can be expected to cause emergence. This research was formulated to instigate this possibility. By characteristics, the researcher refers to all attributes and demonstrable entrepreneurial behaviours which include but not limited to those explored in this research. For instance, here are a few for the purpose of clarity: Confidence, Sense of ownership, Communicativeness, Passion about learning, being a team player, System-orientation, Dedication, Optimism, Gregariousness, exemplary leadership skills, Risk taking, to mention but a few. Findings from the simulation show that these characteristics may not be entirely shared by the entrepreneurs but instead, the entrepreneurial philosophy is the common quality possessed by all entrepreneurs.

The entrepreneurial philosophy here means that, if someone foster’s an entrepreneurial mindset and applies the techniques, strategies and methodologies that successful entrepreneurs use in business, the chances of achieving the desired goals, in the long run, seem greater and possible rather than wearing or having the personality of the successful

Figure 7.15: Trends in entrepreneurs of group ten
entrepreneur.

Figure 4.16: Emergent pattern of Surveys group

Figure 7.17: Emergent field pattern in group one

In the event that the qualities or properties of a class of business people are known, they may be recognized as having a class or not fitting in with that class. They are grouped into classes by taking a closer look at patterns of distinctive attributes and contrasting them with a prototypical member of every class. Pattern identification includes the derivation of patterns from facts, their examination, and ultimately, the recognition of the group (class) each of the patterns fits in with. While the future of this research project expects that an algorithmic sensing mechanism in the form of a computer-aided questionnaire administration for processing, pattern recognition, and segmentation will be developed; my scope of work now will require that physical pattern identification is used to make judgement from the statistical and probability graphs generated by the accumulated data inputs.
Figure 7.18: Emergent field pattern in group two

Figure 7.19: Emergent field pattern in group three

Figure 7.20: Emergent field pattern in group four
Entrepreneurs could be classed according to their types of business (Production, Trading, Engineering, Corporate or Agricultural entrepreneurs), Technology use (Technical, Non-technical and Professional entrepreneurs), Opportunity, Commodity, Solo, Network marketing, Innovation entrepreneurs to mention but a few. For each class listed above, the criteria for evaluation and classification are tangible and visible in most cases. But the measure for categorizing entrepreneurs of the same business type to levels is rather cumbersome and difficult as it requires subjective interpretations. The researcher employs subjective interpretation to classify entrepreneurs in this research into groups of the low, moderate and high probability of occurrence using the Bayesian statistical prediction applied.

If we assume that PT, PK, TE, SN, and EV represents Personality traits, Prior knowledge, Technology know-how, Social network and Economic environment respectively and that based on the field evidence gathered that these five variables combine jointly through Bayesian product rule to predict a certain emergence value, it is reasonable to agree that these variables are able to generate a predictive outcome given the knowledge of each one. It also suffices to argue that since those variables are characteristic qualities collected from the entrepreneurs, the emergent outcome from the joint probability relationship of the variables sensibly predict the tendencies of any entrepreneur given that the variables analysed were their qualities. Any of the variables could be the leading cause of entrepreneurs’ behaviours or a combination of two or more. But if translated into the directed graphs, the possibilities may seem endless as exemplified below.

*Figure 7.21: Emergent field pattern in group five*
Figure 7.22: Emergent field pattern in group six

Figure 7.23: Emergent field pattern in group seven

It is true that measurable pattern recognition is founded from conventional thinking in statistical decision theory to distinguish from various classes by utilizing the qualitative characteristics of the data. Data in the simulation was generated using Bayesian statistical model through the implementation of the expressions illustrated below:

\[
\begin{align*}
\Pr(\text{Emergence}) &= \Pr(\text{PT}|\text{PK}, \text{TE}, \text{SN}, \text{and EV}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \exp25 \\
\Pr(\text{Emergence}) &= \Pr(\text{PK}|\text{PT}, \text{TE}, \text{SN}, \text{and EV}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \exp26 \\
\Pr(\text{Emergence}) &= \Pr(\text{TE}|\text{PK}, \text{PT}, \text{SN}, \text{and EV}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \exp27 \\
\Pr(\text{Emergence}) &= \Pr(\text{SN}|\text{PK}, \text{TE}, \text{PT}, \text{and EV}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \exp28 \\
\Pr(\text{Emergence}) &= \Pr(\text{EV}|\text{PK}, \text{TE}, \text{SN}, \text{and PT}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \exp29
\end{align*}
\]

A further exploration of expressions above yields;
\[ \Pr(\text{Emergence}) = \Pr(PT|PK, TE, SN, EV) \times \Pr(PK, TE, SN, EV) \times \ldots \times \Pr(SN, EV) \times \Pr(EV) \times \exp30 \]

\[ \Pr(\text{Emergence}) = \Pr(PT|PK, TE, SN, EV) \times \Pr(PK|TE, SN, EV) \times \Pr(TE|SN, EV) \times \Pr(SN, EV) \times \Pr(EV) \times \exp31 \]

\[ \Pr(\text{Emergence}) = \Pr(PT|PK, TE, SN, EV) \times \Pr(PK|TE, SN, EV) \times \Pr(TE|SN, EV) \times \Pr(SN, EV) \times \Pr(EV) \times \exp32 \]

\[ \Pr(\text{Emergence}) = \Pr(PT|PK, TE, SN, EV) \times \Pr(PK|TE, SN, EV) \times \Pr(TE|SN, EV) \times \Pr(SN|EV) \times \Pr(EV) \times \exp33 \]

**Figure 7.24: Emergent field pattern in group eight**

Mathematical expression 32 can, therefore, be rewritten in 5! (5 factorial) different ways with possibly very different outcomes, hence it is a complex model for analysis.

**Figure 7.25: Emergent field pattern in group nine**
It has not been thought to be either time-efficient or necessary to set out the details of all 5! or 120 ways of exploring the expression models since the analysis is based on instantaneously acquired data and is subject to variation based on the source (entrepreneurs) change of circumstances, know-how update or insight.

A close observation of the graphs in Figures 7.17 to 7.26 shows a more consistent but occasionally irregular pattern emerging from the data. On the frequency axis of the graphs, it could be deduced that from around the region greater than 0.3 (>0.3) and forward, a spike in the number activities is observed. These illustrate that more entrepreneurial emergence, occurrence or tendency. The number 0.3 in the frequency window axis scale of 0.5 means, 0.3 out of 0.5 which equals 0.3/0.5. This can be translated into our Bayesian prediction probability to mean \( \text{Pr(Emergence)} \Rightarrow 0.3/0.5 \Rightarrow 0.6 \).

Therefore, within our formulation, 0.6 or greater is considered a high probability and the possibility of the entrepreneurial undertaking.

**7.10 What is pattern recognition?**

The ability to recognise a pattern is normally underestimated until confronted with the challenge of educating a machine to do likewise. But what actually is a pattern? Pattern has been defined as the opposite of chaos and the ability to recognise. This leads to the suggestion that pattern recognition is a systemic study of the environment by a machine to learn how to distinguish the items of concern from their surroundings and furthermore settle on a sensible choice about the class or classification of the observed pattern. More
formally, pattern recognition portrays an identification process that blends information from a stimulus with knowledge taken from memory.

### 7.11 Statistical Pattern Recognition

Statistical pattern identification has been utilized efficiently to design diverse business recognition systems (Webb 2002; Pi et al. 2008). In this approach, a pattern is represented by features or attributes which are characteristic of the entities under evaluation. A decision boundary in this study between pattern classes is estimated using a posterior probability estimator (Bayesian Statistics).

The decision-making procedure in statistical pattern identification can be condensed as follows: A particular pattern is to be allotted to one of the classifications PT, PK, SN, TE and EV in light of a vector of the element values Pr (Any). The components are presumed to have a likelihood thickness or mass (dependent upon whether elements are constant or discrete) capacity adapted to the matching design class. Therefore, a pattern vector (element of PT) fitting in with class PT is seen as an observation being drawn indiscriminately from the class-conditional probability function Pr (element in PT). Some documented and popular decision rules, including the Bayes decision rule, the maximum likelihood rule (which can be considered as a particular case of the Bayes rule), and the Neyman-Pearson rule are accessible to determine the decision boundary (Faltin and Kenett 2007; Jain et al. 2000). Different methodologies are used to design a classifier in statistical pattern identification, contingent upon the type of knowledge accessible about the class-conditional densities. In the event that the greater parts of the class-conditional densities are completely stipulated, then the ideal Bayes decision rule can be applied to create a classifier. Nevertheless, the class-conditional densities are not usually known in practice and must be taken from a literature modelled pattern (Jain et al. 2000; Webb 2002; Bishop 2006).

### 7.12 Group One Analysis

#### 7.12.1 Spectral Analysis

The basic concept of emergence in this project is the intangible notion which connotes observations, recognitions, nature and the emergent patterns and relationships evolving
from entrepreneurial attributes which hitherto have not been widely recognised in the literature and apparent in the entrepreneurs’ behavioural expressions.

The aggregation of these attributes (see Figure 5.1) produces a large set of templates of dynamic variables which cannot be studied through approximated linear relationships due to the non-linear interactions between variables and inherent interconnections and interdependence between it. A structure begins to emerge within this context; this structure exhibits system characteristics that seem to be adequately explained when investigated by the tools of complex systems. The conclusion is that this complex structure or pattern is an emergent event which emerges out of both the collaborations within the system and the external influences.

7.12.2 Periodogram Estimation

A basic idea in mathematics and statistics is to take a complicated object (for instance a time series) and break it up into the sum of simple objects that can then be studied individually and then find the pieces that can be jettisoned while retaining those very important parts that can be regarded as an approximation of the original object. The outcome of such a process in time series is what is called Periodogram. This is employed to spot the overriding periods or frequencies of a time series. It, therefore, becomes helpful in determining the recurrent behaviours in the time series pattern or structure.

\[
PE(\omega) = \frac{1}{2\pi} \sum_{|v|<T} (\cos \omega_0 R(v)) ……..exp 34
\]

\[
\equiv \frac{1}{2\pi T} \sum_{t=1}^{T} (X(t) \exp(-i\omega t))^2 ……..exp 35
\]

Where

\[
R(v) = \frac{1}{T} \sum_{t=1}^{T-|v|} (X(t) X(t + v)) ……..exp 36
\]

PE = Periodogram Estimate

One method for assessing the power spectrum of a process is to just locate the discrete-time Fourier transform of the samples of the process and take the magnitude squared of the result. This estimate is called the periodogram.

The periodogram estimate of the Power Spectral Density (PSD) of a length-L signal \( x_L[n] \)
\[ \hat{P}_{xx}(f) = \frac{|X_L(f)|^2}{f_s L} \] ...........exp 37

Where

\[ X_L(f) = \sum_{n = 0}^{L-1} x_L[n] e^{-2\pi j fn / f_s} \] ...........exp 38

The actual calculation of \( X_L(f) \) can be accomplished only at a limited number of frequency points, \( N \), and regularly utilises the Fast Fourier Transform (FFT). In practice, most applications of the periodogram technique calculate the \( N \)-point PSD estimate. FFT is the discrete measure of the Fourier transforms which translate a waveform into its frequency components through a mathematical method. Power spectral density function (PSD) demonstrates the strength of the deviations (energy) as a function of frequency. That is, it reveals at which frequencies deviations are more and at which frequencies they are less. It is computed straightaway by the method called FFT or computing autocorrelation function and then transforming it. However, Fourier transform is derived from a given function which is then represented by series of sinusoidal functions. It decomposes functions of time (in this case; entrepreneurial attributes) into the frequencies that make it up. By frequencies here, the researcher means the variations observed in the behaviours of entrepreneurs when they update themselves with new information in the face of overwhelming heuristics.

\[ \hat{P}_{xx}[f_k] = \left( \frac{|X_L[f_k]|}{f_s L} \right)^2, \quad f_k = \frac{k f_s}{N}, \quad k = 0, 1, \ldots, N - 1 \] ....exp 39

Where

\[ X_L[f_k] = \sum_{n = 0}^{N-1} x_L[n] e^{-2\pi j kn / N} \] ...........exp 40

It is sensible to go with \( N > L \) with the goal that \( N \) is the next power of two larger than \( L \). To evaluate \( X_L[f_k] \), we basically cushion \( x_L[n] \) with zeros to length \( N \). If \( L > N \), we must

### 7.12.3 Derivation of the Coherence Function

Coherence function is the measure of a function related frequency cross-correlation and defined with regards to power spectral densities and the cross-spectral density by

$$ C_{xy}(\omega) = \Delta_{xy}(\omega) = \frac{|R_{xy}(\omega)|^2}{R_x(\omega)R_y(\omega)} \quad \text{exp 41} $$

Where \( \Delta_{xy} = C_{xy} \) is the degree of frequency coherence along the x and y axis

\( (\omega) \) is the frequency component

\( R_{xy} \) is the power spectral density along the x and y-axis

In reality, these quantities can be computed by time-averaging $|X(\omega)Y(\omega)|$, $|X(\omega)|^2$, $|Y(\omega)|^2$ over successive signal blocks. The coherence can be estimated as

$$ \Delta_{xy}(\omega) = C_{xy}(\omega) = \frac{|X(\omega)Y(\omega)|^2}{|X(\omega)|^2|Y(\omega)|^2} \quad \text{exp 42} $$

Where

\( |X(\omega)| \) is the horizontal frequency component

\( |Y(\omega)| \) is the vertical frequency component

\( |X(\omega)Y(\omega)| \) is the absolute average product value of the frequency components

For the purpose of this study where the interest is solely on the observed pattern in the spectral outputs rather than the exploration of the wave formation and dynamics, the details of spectral expressions derivations have been deliberately omitted as it is beyond the scope of this research. The graphical results used in the research analysis were generated through mathematical software called Statistical Package for the Social Science (SPSS) in which all the above statistical expressions were automated. It is predictive analytics software used to predict next outcomes for smarter decision making and solution provision.
Figures 7.27 and 7.28 trends where more agents show high entrepreneurial abilities between the region of 0.32-0.42 and moderate between 0.18-0.32 in the spectral window. An intriguing result from this output is that while every agent possesses entrepreneurial potential, some are better endowed than others.
Figure 7.30: Density distribution of the environmental influence in group one.

Environment and Emergence in Group One

Figure 7.31 Co-spectral density between emergence and environmental factor

A careful examination of the frequency spectra shows that the effectual contributory effect of the environmental variable towards the final agents’ emergence is concentrated in the region of 0.32-0.42 in the spectral window.
A dominant contribution from this variable can be seen at an individual level but have been totally lost in the aggregate effect because the structure of the emergence is a complex one. The overall emergence in this group illustrates a phenomenon that could not have been predicted using the pattern or behaviour observed in one entity alone.
Figure 7.34: Frequency distribution of prior-knowledge in group one

Prior Knowledge and Emergence in Group One

Figure 7.35: Co-spectral comparison of Prior-knowledge and emergent outcome

Figure 7.36: Coherent comparison of the contribution of prior knowledge
Clearly, the final simulations reflect a different outcome, suggesting an emergent structure. This was not a conclusion that sprung intuitively from the initial data but one which required the system to evolve through the interactions of its internal elements and also perturbed by external influences.

Personality Traits in Group One

![Periodogram of PTGP1 by Frequency](image1)

*Figure 7.37: Personality trait periodogram showing personality distribution*

Recent literature suggested that entrepreneurs possess a specific personality (Dvir et al. 2010; Lynn 1969). However, latest findings seems to have contradicted this assertion. Each entrepreneur evolves from the basic knowledge gained, environmental influence and social enclave and inclination to technology. Because the degree of affiliation with each one of this variable and the personality of the individual varies with time due to knowledge acquisition, economic environment fluctuation and the dynamic social behaviours. A static study would not capture the salient points of a dynamic system. The tools designed for complex systems are more relevant to analyse these emergent systems.

![Spectral Density of PTGP1 by Frequency](image2)

*Figure 7.38: Spectral density of entrepreneurial agents' personality trait distribution*
In the same way, as is seen in Figure 7.38, small variations in any initial setting will lead to unpredictable and significantly different outcomes. The personality of the agents shows very differing forms which if conscripted to predict the incidental behaviour of any agent will result in the incorrect outcome and the eventual outcome is evolutionary and emergent and triggers possibly unimaginable change as a result of any minimal variation in any microelement within the complex system.

**Personality Trait and Emergence in Group One**

![Graph of Cospectral Density of EMERGENCEGP1 and PTGP1 by Frequency](image)

*Figure 7.39: Emergence and personality trait variable in the system*

Personality trait shows very low contribution at the time in the agents’ simulated life where the outcome demonstrates positive emergence.

### 7.13 Analysis of Graphical Output

A *periodogram* analyses the diverse frequencies apparent in time-series data to recognize any fundamental periodic signals. It is particularly powerful in analysing time-series where the time intervals are unequal and also where the period frequencies are not correlated. In complexity science study, spectral analysis tools are utilised to determine the emergent patterns in the data. In this study, the data is gathered from entrepreneurs and also generated from the simulator for comparative analysis. Ten groups of data sets were simulated for a comparison with the sample data obtained
from entrepreneurs. One of the principal points of this study is to find patterns and also observe if predictions can be made via simulations in determining entrepreneurs’ activities. In the periodogram, peaked frequencies imply high probable impact of the attribute under study in the cumulative outcome. Whereas each variable (attribute) is observed, its singular behaviour or graphical observation is completely obliterated in the overall outcome due to the nature of emergent systems. While the statistical graph may appear simple, it is rather more complex than it seems, since each output must be seen as a snapshot of occurrence in time. These concentrations seen as frequency spikes is also referred to as spectral density which is here considered as an estimate or a measure of how much power exists or could be found within a frequency band. Power refers to the propensity of possibilities that exist within the data under analysis. In the spectral distribution, frequency peaks on certain values in the plots implies repeated occurrences and increased tendencies of emergent behaviours.

**7.13.1 Environmental factor Periodogram for the groups**

For the purpose of close comparisons and understanding, the graphs from the simulated data will be grouped in tens of the same kind so that, one can have a thorough view of the date outcome. For instance; in this section, the periodogram for the environmental factor of group one is given below as Figures 7.40. More explanation is offered to explain the implication and meaning of the graph and the trends that seem to emerge. For more details and similar group graphs, refer to Appendix.

![Periodogram of EVGP1 by Frequency](image)

*Figure 7.40: Rate of environmental influence in group one*

An examination of the trends from ten groups of entrepreneurs (graphed in Figures 7.40
and Environmental group in appendix 3) reveals some interesting patterns. There are consistent and similar patterns among these groups. Higher regions of activity aggregate between about 0.24 to 0.26 and 0.36 to 0.41. Precise justifications for this trend may not be easy to make, but prima facie, it does seem likely that entrepreneurial activities become tailored to suit the environment. Alternatively, they may suffer suffocation due to lack of essential services, manpower, techniques and other demands. A more intricate examination on this perception will be given in the discussion Chapter.

7.13.2 Prior Knowledge Periodogram

![Periodogram of PKGP1 by Frequency](image)

*Figure 7.41: Frequency of prior knowledge influence in group one*

Again there are consistent and similar patterns among the group in Figures 7.41 (and in the appendix 3 Prior knowledge group). A high region of activity is concentrated around 0.4. This suggests that increased knowledge results in more entrepreneurial exploration such as research and innovations; these are significant drivers of modern entrepreneurship. The multiple spikes in this prior knowledge periodogram emphasises its necessity.

7.13.3 Personality Trait Periodogram
The groups in Figures 7.42 (and the Personality group in appendix 3) demonstrate a strong variation amongst the Personality trends in the groups. While this does not contradict the idea put forth in some of the literature that personality does not influence entrepreneurship (Lynn 1969; Elmuti et al. 2011), it also supports the contention that the personality trait of the individual or group of entrepreneurs largely influences how they develop in their pursuit for entrepreneurial excellence. The inconsistent pattern seen in the Figures emphasises the uniqueness of personality to an entrepreneur. Previous qualitative research work has not brought to the fore the idea that each entrepreneur has a personal approach to pursuing success while sharing a common passion and commitment that may be generally expressed by other entrepreneurs (Lynn 1969; Elmuti et al. 2011). Also, a more comprehensive discussion on this is provided in the discussion Chapter following.

7.13.4 Social Network Periodogram

Below are the ten Social attribute graphics each from one group as classified in the simulation. This will provide a close look at the similarities and differences in the composite attribute of entrepreneurs as they interrelate and are influenced by their social network.
Figures 7.43 (and in Social network group in appendix 3) are internally consistent, inferring that the social network of distinct entrepreneurs plays similar roles in their pursuit for excellence. Previous research works has shown that every entrepreneur needs a network to communicate, share and learn ideas and also receive feedback to reappraise their decisions and ideas (Klyver and Schøtt 2011; Greve 1995). The network often provides encouragement in the face of what may appear to be a failure. These findings concur with Lowe and Marriott (2006), who suggest that failure is part of an entrepreneurial journey in which success is relative and based on perspective.

7.13.5 Periodogram for Technology

Figure 7.44: A trace of Technology influence in group one
With a few exceptions, Figures 7.44 (and in the Technology group in appendix 3), exhibit a similar trend. The similarities suggest that since technological innovations have become a part of the entrepreneurial landscape, it is difficult to distinguish its specific influence on entrepreneurs. So much of everyday life is imbued by technology, which thereby becomes embedded in the personality of the entrepreneurs. The variation observed in a group may reflect the fact that, since not all entrepreneurial activities rely on technology, it may be that a few of the ventures are able to survive without the assistance of technology.

7.14 Coherency Analysis

In this research, coherence is used to detect any recurring attribute between two or more entrepreneurs. The greater the coherency in the data in relation to the entrepreneurs, the less support there is for the argument that entrepreneurship is complex and emergent. This is an important construct of the research that a more in-depth analysis of spectral data generated from a simulated comparative analysis of one thousand entrepreneurs divided into groups of hundred and fifty primary entrepreneurs was conducted.

7.14.1 Environmental factor Coherency

![Coherency of EMERGENCEGP1 and EVGP1 by Frequency](image)

*Figure 7.45: Group one environmental degree of coherence of entrepreneurs*
7.14.2 Prior Knowledge Coherency

![Graph showing coherency of EMERGENCEGP1 and PKGP1 by frequency.]

Figure 7.46: Prior knowledge coherence among entrepreneurs in group one

7.14.3 Personality Trait Coherency

![Graph showing coherency of EMERGENCEGP1 and PTGP1 by frequency.]

Figure 7.47: Personality trait coherence among entrepreneurs in group one

7.14.4 Social Network Coherency
Figure 7.48: Coherency patterns observed in Social network in group one

7.14.5 Technology Coherency

Figure 7.49: Technology attribute coherency patterns observed in group one

7.15 Changes in Simulation patterns as the entrepreneurs acquire knowledge (Experience)

The current research work prompts the conclusion that knowledge is the key element of business enterprise. The would-be entrepreneur needs the courage to implement know-how as a leadership quality.

In the dynamic simulator window in Figure 7.50, the simulation illustrates how entrepreneurs thrive as their expertise grows through associations and interactions. The grouping patterns and the learning curve attraction in the Figures 7.50 to 7.58 agrees with the argument in this research that, the entrepreneurial behaviours of people is not a linear
function of their characteristics but a non-linear, complex and emerging function with relative instability as a result of a continuous shift in knowledge asymmetry. This is the reason why the ideology in this method was proposed to aid in the understanding of entrepreneurship through a non-linear modelling style termed, system thinking and what this study calls complex system thinking as emphasised in the methodology Chapter.

Figures 7.50 to 7.58 illustrate the graphical presentation of entrepreneurs as agents in virtual environments interacting and learning (updating knowledge) by socially networking together using the flocking rules. Flocking behaviour is the characteristic disposition displayed when a drove of birds, termed a flock, are foraging or in flight. This is comparable to the shoaling conduct of fish, the swarming conduct of insects, and grouping conduct of land animals. From the standpoint of the statistical modeller, flocking is the aggregate movement of countless self-driving and organizing entities. It is the aggregate conduct shown by numerous living creatures, for example, birds, fish, microscopic organisms, and bugs (Sinkovits, 2006). It is viewed as an emergent behaviour emerging from basic rules that are trailed by people and does not include any central coordination. These actions were considered more appropriate to use in describing how potential entrepreneurs network and search for knowledge in their pursuit for expertise. Emergent behaviour from the simulator shows agents congregating towards high knowledge domain (activist agents and information centres) in their quest to gain insight. This implies that knowledge acquisition and application is truly crucial in any entrepreneurial pursuit. More insight is provided at the end of this section.

Figure 7.50: Virtual world window trace by free agents in search of knowledge

In the Figure 7.50, having adopted flocking behaviour as the simulation style the agents
appear to congregate towards knowledge hierarchy.

**Figure 7.51:** Virtual world showing the alignment of agents in search of knowledge

**Figure 7.52:** Simulator window showing an emerging well-informed agents society

**Figure 7.53:** Virtual world showing emerging knowledge centres due to activist agents
Figure 7.54: Virtual world view of the distribution of agents becoming activists

Figure 7.55: Traces of activist agents in the environment towards self-fulfilment.

Figure 7.56: Emerging information centres from the build up activist agents
A close look at the Figures 7.50 - 7.58 shows a concurrent pattern amongst the groups of agents (entrepreneurs). This suggests that the observed entrepreneurial endeavours holistically present a closely similar attribute trend which is characteristic of entrepreneurship. However, an individualistic study of the endeavours shows a variation between the individuals that are classed together into groups. This is consistent with the view presented here that no two entrepreneurial engagements or entrepreneurs are exactly the same. This distinction needs to be kept in mind when analysing entrepreneurial behaviours.
Chapter 8: Research Findings and Discussions

8.1 Discussion

Albert Einstein (n.d.) once said as I paraphrase, the essential thing is not to stop learning. Curiosity has its own reason for existing and imagination is more important than knowledge.

Literature over the years has had evolving ideas on how best to describe or explain entrepreneurship. Many have called it a creative venture; some has considered it as an innovative venture while some others have perceived it as a cognitive process (Vaghely and Julien 2010; Wright and Marlow 2011; Brenkert 2009). All these concepts have seen wide discussion in the body of literature with a conscious attempt to explain the concept of entrepreneurship. Taking into account all these conceptual ideologies, this work puts forward the conjecture that entrepreneurship is an emergent concept and one that is not dependent on any single explanation; instead, it is dependent on variables which are subject to chaos and instability. Hence, it is imperative to view entrepreneurship as an emergent cognitive, creative and innovative process that yields the desired goal. Because extant theories and explanations offered in the literature have not been able to predict this emergent trend, this becomes a major insight provided through simulation. Therefore, this research simulation methodology is a contribution to the field of entrepreneurship.

Our universe, our world, and our immediate societies are shaped by histories. In the past, historical and social scientific research has often been an exploration of the past in search for recurring trends or patterns (Kuratko 2005; Kuratko and Hodgetts 1998). These can be compared with current or perturbed trends to produced scenarios for comparative analysis. This is consistent with the scope and logic embedded in the idea of this research work. It should be emphasized that this study is not making precise predictions (such as The weather will be fine in two days time); rather it is outlining possible scenarios like for instance, (Winter in the future are more likely to be cold and dry). It is therefore aimed at advancing the perception and study of entrepreneurship.

This is worthy of reiteration. It would not be correct to generalise entrepreneurial experience or suggest outcomes since individual or group disparity have an essential impact in the achievement of any venture due to the need for persistence in the face of
uncertainty even when it is seemingly obvious that entrepreneurs are in a quandary. Also noteworthy is that this study does not only consider the attributes of successful entrepreneurs but also incorporates observations from the prospective of both, active successful and failed entrepreneurs since the reasons for failure are themselves worth modelling.

The environment does not work as a trigger the way behaviourism would have it. The actors' (agent's) own particular elements, though continuously reset and recalibrated through relevant limitations which built up as a consequence of exchanges with that environment. This segments the space of options and along these lines structures and naturally winnow the specialists' alternatives. Since the environment and other relevant contemplations have been disguised as an after-effect of positive input circles, the outside structure will consequently choose from the different choices (Khalidi, 2001).

In an information discovery experiment, Freeman found that, when creatures took in a reaction to a smell, every aroma was seen to have a particular spatial adequacy design. During the time spent investigating this concept, Freeman discovered obvious confirmation of naturally critical self-association: stable spatiotemporal structures in olfactory EEGs activated by a little variation (in the smell). In the wake of making this initial disclosure, Freeman made a fascinating inquiry. What happens to the first spatial example connected with the principal smell when a second smell is found out? If the first representation is really steady (like the stimulus reaction that it is associated with), it ought not to be changed by new learning. To outline this allegorically, let assume one barely figured out how to relate peppermint with some attribute. After the learning was finished, one's spatial EEG design for peppermint was resolved. Along these lines, one figured out how to associate cinnamon with a unique attribute. After this run, one's example for cinnamon was evaluated also. If one again smelled peppermint and were tested again, one might expect the pattern associated with peppermint to look the same as it did before. At the point when Freeman ran a comparison test with creatures, nonetheless, he found that the exact inverse happened. The pattern for peppermint changed when it was tried once more. He was compelled to infer that the neural representation of a smell is not settled like a photo. Rather, the nature of old learning is modified in the context of later learning. This reformation of the sensory system is not consistent with the perspective that, discrete classes of experience are put away in settled physiological patterns in the mind. It is likewise an extra confirmation of self-association: spatiotemporal structures that have some level of consistency and yet can restructure
themselves when destabilized by new information as indicated by (Barton, 1994).

Freeman’s experiment and its conclusions can be seen to supply an adequate justification for the findings in this project on the subject of the emergent patterns seen in the life of entrepreneurs, with a few exceptions of course. It clearly suggests that entrepreneurs learn continuously and progressively and that experiences are stored up in the ‘brain’, which is acting as a knowledge database. For every example of knowledge update or new learning, the know-how of the entrepreneur is reset. Hence, a variation in the behaviour can be expected from the knowledge update.

But how is the new information generated? This question still has not been properly answered about whether individuals (prospecting business visionaries) develop their insight because of financial advances of an environment or by leaning towards business people who have accomplished certain information level such that they impact their surroundings or a mix of both characteristics. In all actuality, business people exists the world over regardless of the level of economic development. Notwithstanding, the type of surrounding environments determine in most cases the sorts of entrepreneurial actions that are sought after inside of it. In spite of the fact that simulation result is relied upon to demonstrate that, as effective business visionaries go about their interactions to extend their enterprises, they become attractive to individuals including their employees and by so, development is perceived to be a sketch of the pattern or trail left by a compelling business visionary instead of an outspread financial extension of an economy achieved by congested commercial exercises.

In a similar way, the dynamics of a complex system is governed by a wide-range of conjointly dependent mechanisms that interact along the system hierarchy (Mot, 2010). Each mechanism creates resilient uncertainty however, but for the very special circumstances, none of these systems alone sustains such that the others can be dismissed (Bird et al., 2012). Thus, creating a theory that could describe the system behaviour by means of a collection of logical-mathematical expressions is unrealistic and could be deceiving as well (Lichtenstein, 2011). A most important feature of complex systems is a persistent recurrence of amazing occasions—uncommon occurrences of low likelihood, however, with high consequence on a structure where they happen (perturbation). In dissimilar surroundings, they are also recognised as precarious shifts or evolutions, tragedies, calamities, and emergencies. Amongst the consistent behaviour patterns of complex systems are predictive ones that occur more regularly as an extreme event.
become apparent (Baron and Ensley 2006; Chwif et al. 1996; Epstein 1999). Predictive occurrences and extreme events are consecutive expressions of a system’s dynamics. These patterns may not trigger extreme events but simply indicates the growing of instability, making the system apt for extreme events. Finding premonitory patterns creates a basis for the development of algorithms for prediction of extreme events and is pivotal for basic comprehension of relevant complex systems (Sonnessa, 2004). Specifically, the following types of premonitory patterns have been identified formerly: intensity, clustering, the range of correlation in space, and change of scaling.

8.2 Entrepreneurship as a phenomenon

We live in an undeniably interconnected world. Rainforest obliteration in South America may prompt Greenhouse impacts and climate design changes in Africa. Market falls in the Far East can wreak extraordinary outcomes on economies in the West. Linear modelling which evaluates events in isolation is not capable of analysing and highlighting these intricate systemic impacts. Educated (Informed) residents in such an exceedingly associating world need apparatuses that can offer them some assistance with coping with these complexities since numerous regular unexpected events and encounters emerge from the collaborations of different diverse variables.

Why are there such a variety of patterns on the planet? While pondering over this question in full would take us far away from the scope of this research, we can begin with a basic observation: extensive scale designs and patterns on the planet are generally resulting from the associations of huge quantities of smaller parts or objects that in some way or another join in an unpredictable manner to produce the substantial scale design or pattern. Such huge scale (large scale) designs that emerge out of the associations of various connecting (miniaturized scale) agents, items or objects are called emergent phenomena — that is, a design that emerges out of inter-relationships at a lower level or scale (Wilensky, 2000). An appreciation of patterns as emerging designs, as opposed to resulting from equations, is both a more exact representation of nature and, when presented as diagrams, is significantly easier for most people to understand.

This research has revealed entrepreneurial behaviours as an observable systematic perception of behavioural emergence and directed commercial drive towards satisfying needs. The needs here are mostly client or customer oriented hence; the new approach
emergence is seen as client oriented innovations and inventions, and consumer or customer oriented culture all embedded in technology dynamics which involves the incremental innovative changes to creative destruction.

Drucker (2002) describes entrepreneurship as a systemic practice that is neither science nor an art and sprouts from its knowledge base. He conjectures that the knowledge base, just like in other disciplines like medicine and engineering, is largely a means to an end. Hence, entrepreneurship should be better explained backwards from the end through the means to the initial aim. This further suggests that theory and practice are completely different and a proper definition of entrepreneurship should inculcate both aspects of knowledge exploration. Taking this thought into recognition, the researcher concurs that theory based artificial simulation is more appropriate in combining the thoughts into a single unit for analysis and explaining the entrepreneurial practice. Since the researcher could not find literature which studied entrepreneurship using simulation, there was a need to initiate it, since simulation is ideal and relevant in providing an understanding of entrepreneurship.

This research improves explanations given to the entrepreneurial quest, engagement or establishments in the literature, but for further clarity, let us explore an illustration given by (Drucker, 2002); Every accomplished doctor have seen supernatural occurring cures, where patients experiencing terminal diseases recuperate all of a sudden sometimes suddenly or periodically by going to spiritual or faith healers, or by changing to some awkward eating routine, or by resting amid the day and being up and about throughout the night. Only but a narrow-minded person denies that such cures happen and dismisses them as unscientific. They are sufficiently genuine yet no doctor is going to put miracle cure into a reading material or into a course to be taught to medical students. They cannot be repeated, cannot be taught and cannot be learned. Similarly, there are innovations that do not proceed from any organized, purposeful, systematic manner but rather from a spark of genius instead of through a structured systemic program or plan. These types of innovation cannot be replicated, imparted and acquired academically because there is no way that, the act of being a genius can be taught or learned.

8.3 What is different?

There is nothing that living things do that cannot be understood from the point of view
That an entrepreneur is born or disposed to becoming an entrepreneur naturally contradicts the argument of this research, where entrepreneurs emerge from a process that is a complex function of the interactions between personal abilities and knowledge which continually updates and evolve until a sensible gap and tradable opportunity arises for venture exploration. The literature thus far has not provided an exhaustive or near exhaustive understanding of this phenomenon called entrepreneurship. This is why researchers in the twenty-first-century business atmosphere have continuously made effort to craft a new idea of strategic entrepreneurship through a constructive combination of entrepreneurship and strategic management fields. In spite of their effort, there remains much to be understood about what constitutes strategic entrepreneurship. The body of knowledge in this field has continued to grow through a multi-perspective approach for a proper concept development (Kuratko, 2009). Therefore, the notion of an emerging concept in entrepreneurship is obviously dynamic and requires the intersections of divergent entrepreneurial explanations. Hence, I employ the approach of a dynamic simulation to accentuate a more rational exploration of entrepreneurial evolution. The application of simulation methodology and the predictive capability through pattern comparison will improve our current understanding of entrepreneurship. Entrepreneurship is continuously changing because of its dependent on numerous factors of influence. This suggests that application of artificially orchestrated agents behaviours modelled after our perception of entrepreneurs will provide a better understanding of this practice. This leads to my utilizing the simulation methodology which becomes one of the unique additions to the academic body of enquiry in this area of study.

8.4 Questioning the Extant Literature

Do inventions and innovations exist already and just waiting to be discovered or, do they emerge? Are opportunities coincidental and discovered or are they emergent through the knowledge or gap seeking entrepreneur? By what means would it be advisable for us to think about entrepreneurship? Should we concentrate on the psychology, philosophy, disposition or characteristics of individuals who get to be business visionaries or should we explore the networks or systems that individuals are associated with? Should we underline the motivating forces, settings, and environments that lead individuals to wind
up entrepreneurial? Mole and Ram (2011) considers the emergence and advancement of business enterprise (entrepreneurship) as an intellectual field of expertise. This research establishes that it is not adequate to attempt explaining a dynamic concept using a stationary approach. Entrepreneurship is a dynamic and individualised concept which varies significantly though with many similarities. The body of literature portrays this ideology through a fixated view which seems to disregard the constant changes that occur in the process of entrepreneurs’ development and sustenance. While this research holds the view that knowledge (information) is the base of present entrepreneurship, it will be reasonable to say that the avalanche of information and ease of access implies that, any concept that is influenced greatly by information will oscillate in accordance with information changes or updates.

**8.5 Research Convergence**

Research convergence refers to the concepts and philosophies in this research that are shared with other academic literature. It is certain that entrepreneurs identify opportunity gap(s) that exist in business environments, however, this research questions how these opportunities are discerned and how they emerge. Extant literature suggests that every entrepreneurial endeavour is opportunity dependant (Mot 2010; Shane 2000a; Berglund 2007). Be that as it may, by what means would it be a good idea for us to consider business enterprise? Should we concentrate on the psychology of individuals who get to be business people or consider the networks or systems that these individuals are connected to? Should we stress the impetuses, connection, and environment that lead individuals to wind up entrepreneurial? There are uncertainty and diversity in methods for considering business enterprise: rather than via rigid subjects such as finance or opportunities. Mole and Ram (2011) laid more emphasis on perspectives or ways of perceiving and conceptualizing the study of entrepreneurship. Their work on entrepreneurial points of view looks at the emergence and advancement of the business enterprise as a scholastic order with a crucial emphasis on practice and operations as well as convolutedly interconnect between the variables that all together contribute to the overall emergence of entrepreneurs (Mole and Ram, 2011).
8.6 Research Overall Contribution and Novelty

Simplified conceptual model, simulation technique applications, emergent and complex system thinking methodology are few of the original contributions that this work is adding to entrepreneurship.

Computer-assisted simulation modelling has ended up valuable as a strategy for an inquest in social science towards the end of last century. Significant numbers of specialists, disturbed by both unique theorizing and solid forecast, have accepted varieties of the methodology. In some disciplinary fields, the utilization of computer-aided simulation modelling is a routine and an exceedingly acknowledged exploration strategy, for instance, in business management, financial and social sciences. In different fields of social sciences, the utilization of computer-aided simulation techniques is still rather fascinating or employed by some business professionals (Sonnessa 2004; Chwif et al. 1996; Cadotte n.d.).

The debate on its usefulness will eventually be settled by whether the methodology delivers practical helpful results as it has in the physical life, and numerous connected social science fields. Since I have explored computer-assisted simulation as a suitable methodology in this research, I also examine the statistical models adopted for forecasting and estimation as employed in this study and embedded in the concept and methodology. I shall start with a brief description of models and of the simulation technique and after that, clarify the general rationale behind the utilization of the model by method of simulation and by which this strategy provides helpful learning about the naturally occurring but uncertain events that worry social researchers.

Emergence has been shown in this research to be formed by a process which takes place through time and at multiple levels characterised by multiple behaviours. In concordance with (Davidsson and Wiklund 2001; Davidsson 2003), entrepreneurial behaviours cannot be relegated to individual accounts but a composite and interactive engagements with the societal values in the domain of varying environmental influences. Therefore, there was a need for model building from an empirical perspective which is informed by both entrepreneurship and social theories. This model’s methodology has to theorise the interactions between agents and structures in a dynamic manner. Since the literature (Lichtenstein 2011; Lichtenstein 2012; Emergence et al. 2014; Hartford 1994) views entrepreneurship as a societal phenomenon and the society is constantly evolving through
socio-economic practices and increased technological embeddedness, the entrepreneurial practices can only continue to emerge and re-emerge precisely because of its embeddedness in society and its interactions.

This research has also been able to show that emergence is formed by processes that take place through time and multiple nature of events or existence as characterised by various behavioural characteristics. The implication is that the account of social values and effects of entrepreneurship will be incomplete if the entrepreneurship procedure is isolated from the behaviour of the individual or group. Therefore, it becomes crucial to inculcate externalities that consciously and unconsciously influence entrepreneurship. In concordance with (Fuller et al., 2008) this study also find that model building from empirical studies in entrepreneurship informed by entrepreneurship and social theories has resonance with an emergence perspective in social science. It presupposes an interlinked process that creates emergence in the field of enterprise which ostensibly illuminate hypothesis in connection with the development of the more extensive social financial area. Consequently, the accentuation is that the procedures give clarification of collaborations in the middle of the structure and specialises in a dualistic way which suggests; nature is as critical as the procedure is to the creation of progress in regular financial and economic activities existing in the area of enterprise.

The present monetary situations and predominant human exercises are as far as human wants and needs are progressive and are varying at a rate that only versatile businesses withstands the survival test. Accordingly, it is the result of activities, utilization of information and variety of natural strengths as opposed to the character of any business visionary that spring forward entrepreneurial belief system (Martinez, 2001). The entrepreneurial moves from possessing a business thought to a business person, to an enterprise and lastly to setting-up firm start not by harbouring the aspiration to engage in business but by embarking on actions or exercises that further the aim. An opportunity is identified out of the pool of thoughts wherein one thought is improved over another or it is upgraded by the other. In this circle, an apparent business thought develops which is labelled an opportunity if the predominant monetary situations and surroundings take into account its exploration. This thoughts/information gets to be entrepreneurial if an activity favouring its useful application is commenced in the face of risks and uncertainties.

After a close study of the initial simulation results, it was observed that credence has not been given to how much entrepreneurs’ personality traits is influenced by externalities
especially the extended persona of the individual or group.

To properly ascertain this, the conceptual framework needed to accommodate the extended persona which has been neglected in entrepreneurship literature. In this digital age, people just like entrepreneurs live their daily lives with the aid of extended attributes such as extended minds as regarding smart mobile phones, memory storages, and daily heuristics. It becomes imperative to notice that technology and prior knowledge sway entrepreneurial behaviours via social media and virtual environments. In the case of the modern society, it has become obvious that just an entrepreneurial mindset focused on technological and digital innovations is able to effectively alter or shape the decisions that produce ideas which are propagated in entrepreneurial corridors.

A careful look at the result of the simulations shows a stochastic behaviour of the characteristic elements in this study, as well as shows an emergent phenomenon that illustrates a strong correlation between the influences of technology and personality traits on modern entrepreneurial innovation and evolutions. A similar simulation without technology factor shows relatively linear graphical outputs. This does not describe the entrepreneurial pattern as no two entrepreneurs have got exactly same experience or capacity to conceive and birth ideas and opportunities hence, technological inclination has become a very crucial perspective of entrepreneurship regardless of the platform.

Research data were generated through simulation for prediction and through a questionnaire for proposition confirmation. Questionnaires were submitted to fifty entrepreneurs; of which, forty-seven replied which was a very pleasing rate of return. The simulation data generating technique employed is an automated replica of the questionnaire deployed for comparative data generation. Research in entrepreneurship has always sourced its data either from database records or from questionnaires. In order to ensure authenticity and trustworthiness of the research data and outcome, careful consideration has been given to the design of the simulator to mimic the real life questionnaires used and which has already found acceptance in the general entrepreneurship research literature.
8.7 Research Objectives

The researcher had to;

i. Embark on a critical and wide-ranging literature re-evaluation to define the inherent quantitative and behavioural gap in the study of entrepreneurial opportunity, from the particular perspective of enterprise policy.

ii. Develop a conceptual framework consisting of evidence-based entrepreneurial traits and economic variables conducive for entrepreneurial opportunity.

iii. Design or identify and select simulation software capable of dynamic simulation and develop a dynamic simulation model.

iv. Run the entrepreneurial opportunity seeking simulation scenarios under investigation, which includes varying the locations of the single information center, evaluation of multiple information centers and investigation of distributed information centers, to measure the effect on entrepreneurial opportunity emergence and exploitation.

v. Evaluate static and dynamic perspectives of entrepreneurs' behaviours and opportunity seeking, as they interact with available sources of enterprise information and inspiration.

vi. Interpret the simulation results through focus groups in the context of actual Nigerian entrepreneurial policies and activities of Nigerian entrepreneurs, and make policy recommendations to improve Nigerian entrepreneurial policy making and document all the procedure in a document called dissertation.
8.7.1 How research objectives were achieved

**Objective 1:** keeping in mind the end goal to comprehend and appreciate the proposed concept in this research, the researcher embarked on a thematic and critical evaluation of extant literature to find and define the gap presumed to exist in entrepreneurial opportunity seeking processes. A diversity of literature were evaluated especially those literature that discusses the opportunity in entrepreneurship, the emergence of local economies and entrepreneurial systems, complex economic system and how they operate. The evaluation during this time scale revealed that entrepreneurship has been studied repeatedly as a static field were the complex parameter of cognitive emergence was missing even though it appears to be a crucial aspect of entrepreneurial processes especially in our modern and evolving societies and communities. The result of this objective is contained in the narrative of chapters two, three and four respectively.

**Objective 2:** This time frame shows an overlap with the period in objective one. This was because whilst objective one was yielding the perceived gap, it was necessary to start the creation and design of a suitable framework for the concept that will appropriately bridge the supposed gap. Creation of a conceptual model that proportionately suits the various economic environments seen in the literature and from which data samples were drawn to determine how entrepreneurs discover opportunities within their environment and how these factors motivate them to act and explore the opportunities they perceive. The conceptual model is articulated from the entrepreneurial traits found in the literature, the traits’ intra-actions and interactions with the various formations and locations of the enterprise knowledge centers (information-centers). It forms the base source for simulated data and its subsequent analysis. Chapter five of this research-work expresses this objective outcome in detail.
**Objective 3 and 4:** Having obtained a substantive research gap and created a theoretical and conceptual framework to model the systemic solution that can fill the gap, it was at this juncture necessary to design and apply suitable simulator(s) that are capable of solving the cognitive emergence gap found in the study from objective one when deployed. The simulation was considered as more appropriate to use in filling the literature gap because of the seemingly complex nature of human behaviours and how volatile they become when updated with information.

A dynamic Bayesian probability modelled simulator was designed using a C-sharp programming language which was employed to test the conceptual model proposed and also mobile and dynamic simulator (NetLogo) was used to study the physical behaviours of supposed entrepreneurs which appeared as agents in the simulator. Since entrepreneurs use their active imagination to create new ideas by how they *Think, Act and Interact*, the model was designed to extract entrepreneurial behavioural patterns in stochastic cum complex static and dynamic simulations, as conceptualised in the conceptual framework. Chapters five, six and seven contain in more details the expression of this objective and how it was achieved (Bennett 2010; Faltin and Kenett 2007).
Objective 5: In the research simulation context, the location of information centers, knowledge update timing for agents, activists, informed and aware agents flocking, will be varied repeatedly in a single cluster, multiple cluster and randomly positioned information centers, and the agents' behaviours observed and recorded for analysis and comparison against focus (questionnaire) group data. That is, observations of agents’ behaviour, the effects of information center on the agent awareness and entrepreneurial growth in the context of the simulation. Information centers emulate the enterprise structures created by government or private institutions to enable creation or development of enterprise knowledge that enhances the economic well-being of an economic zone. Agents will represent entrepreneurs who gain knowledge progressively to become active entrepreneurs; which without a constant update of their information base tend to lose their active entrepreneurial knowledge and abilities. Also, any information centre that does not contribute to the increase in the entrepreneurial knowledge base of an agent over a specified period of time (Non-Usage limit) becomes unprofitable and fizzes out of the system naturally. Details and explanation of how the simulator works are elaborately described in the research methodology section in chapter six and section 6.6 of the dissertation. Also, the Bayesian statistical prediction model was used to pattern and create the simulator through a careful mathematically derived probability relationship between the entrepreneurial characteristic behaviours and the causative variables. From these (Bayesian simulator model and NetLogo dynamic simulator), data were generated for analysis and prediction of the creative tendencies in an agent (entrepreneur).

Objective 6: The results of the simulations was aggregated and the findings compared to actual entrepreneurial activities as have been collated from the questionnaires issued and the feedback received from the 47 participating entrepreneurs across Nigeria. If any variation from normal is observed, dependent on how positive that may be, appropriate policy recommendations suitable to enhance economic developments in entrepreneurial engagements was made. It is crucial to note that, the result is interpreted in the context of the data obtained from the entrepreneurs survey through questionnaires feedback and this time frame was mostly the writing up period for the dissertation story and findings.
Chapter 9: Research Conclusion

9.1 Conclusion

In this study, the creation of novel order through processes which are contextually contingent and produces unpredictable outcomes at unpredictable periods sums up the achievement of this research work. The novelty is in the creation of Simupreneurship. Simupreneurship is the study of entrepreneurship using simulations as a research methodology. This is in agreement with the theories of complexity and chaos which accords us with an insight into outcomes and processes linked to entrepreneurship. This research makes a contribution which would rather propose entrepreneurship to be analysed and studied as an emergent phenomenon rather than just an opportunity recognition approach (Nicolaou et al. 2009; Vaghely and Julien 2010; Mot 2010; Schenkel 2004) which credits the individual for their exploit and ignores the societal, environmental and dynamic knowledge overload prevalent in the present day societies and its effects and influence on the entrepreneurial trends.

An undeniable reasoning from the outcomes is that, the choices and assumptions noticed in a business visionary's actions are impacted much by discernments. This finding can suitably be comprehended if observed from the viewpoint of procured learning (attained know-how): explanatory, methodological and obtrusive implicit information. The intellectual conduct in the modelling eventually recommends that actors (agents) have a tendency to converge for the duration of knowledge sourcing, acquirement and based on logical opportunity, after achieving autonomy or acquiring sufficient certainty might search it's (agents) learning storage memory to recommend answers to acknowledged issues or remodel existing ideas consequently inciting advancement and innovativeness. This challenges present day learning curriculum in entrepreneurial centres and institutions of higher learning where the act of entrepreneurship has been taught continuously as a linear and planned out event designed to achieve a defined goal. The result of this research survey suggested rather that the process that result into entrepreneurial accomplishment can not be totally determined from the beginning as it involves alot of contingent occurrences. To further understand this finding, a predictive
mechanism using a Bayesian probability model was applied to this research. The output generated was analysed using a forecasting tool in Statistical Package for Social Science (SPSS) and it clearly yielded a pattern which suggested that all entrepreneurs aim and attempt to converge at the same goal but will individually grow and accumulate the abilities through divergent means. The emergent patterns suggest that success patterns or trends could be observed. Therefore, it is important that the teaching of entrepreneurship should be focused more on the emergent nature of the process rather than aim since the outcome is very much dependent or influenced by circumstantial variables that may not have been considered in the initial set out plan.

9.2 Research Limitations

The framework created and employed in this research has some precincts. First, as an intricate composition, which substitutes opportunity emergence in place of opportunity discovery and creation as well as understudying entrepreneurial attitudes which are believed to be affected by numerous variables at various levels of scrutiny, yet this research has concentrated on only five complimentary factors (Personality traits, Social Networks, Prior Knowledge, Technology know-how and Economic Environment). While the implementation so far may appear not adequately tested yet, the researcher can guarantee that the results, model, and framework were carefully designed to reduce errors to the barest minimum. The limitation in the number of variables explored implies that the methodology can be made more complex by addition of unit variables that fit any given entrepreneurial environment. This deliberate deceptive simplicity allows an experimental assessment of the model. This was necessary because an essential quality of any theory is its testability, verification and validation. However, in advancing the research further, more factors can be infused to test the predictions coming forth from this model. This research was also limited by the sampling method adopted in sharing the questionnaires because, this does not adequately mirror the distribution of entrepreneurs across the Nigerian environment.

9.3 Future of this research

Researchers are now considering some observational reasons for thinking that running of
incomprehensibly numerous modelling of human personalities would be within the capacity of a future development that has created a significant number of those technologies that has as of now appeared to be persistent with known physical laws and scientific limitations.

The brain implements the mind. It is a complex machine built-in wetware (Anon n.d.). A typical presumption in the study of intellectual reasoning is that of substrate-autonomy. The thought is that intellectual conditions can supersede on any of an expansive rank of substantial substrates. Given a framework (system) that executes the accurate kind of computational configuration and procedures; it can be connected with cognizant experiences. It is not a fundamental component of awareness that it is executed on carbon-based natural neural systems in the brain: silicon-based processors inside a computer could on a fundamental level do the trick too.

A computer operating appropriate system software would be cognizant. Besides, we require not anticipating that in an attempt to create a brain on a processor (computer), it is adequate to program it in a manner that it carries on like a human in all circumstances, as well as finishing the Turing test and so forth. We require just the weaker presumption that it would be sufficient for the era of subjective encounters that the computational procedures of a person’s cerebrum are basically reproduced in accurately fine-grained point of interest, for example, on the rank of personal neural connections. This constricted rendition of substrate-freedom is generally acknowledged. However, how soon is this possible?

It in this way appears to be conceivable that the principle computational expense in making simulations that are indistinct from material actuality for individual personalities in the simulation lives in mimicking natural brains down to the neuronal or sub-neuronal level. While it is impractical to get a correct assessment of the expense of a practical reproduction of mankind's history, we can utilize \(10^{33} - 10^{36}\) operations as an approximate estimation. As researchers acquire more knowledge with virtual reality, we (researchers) will improve the capacity to handle the computational necessities for making such universes seem practical to their guests. In any case, regardless of the fact that our evaluation is off by a few magnitude of size, this does not make a difference much for our contention. Researchers noticed that a rough estimate of the mathematical capacity of a planetary-mass computer is \(10^{42}\) operations for each second, and that supposes an already apparent nanotechnological outlines, which are likely a long way from ideal. Such a capacity microprocessor in a computer could simulate the whole
mental history of mankind (call this a progenitor recreation) by utilizing under one millionth of its handling power for one second. A post-human progress might, in the long run, fabricate a galactic quantity of such computers. We (researchers) can reason that the processing power accessible to a post-human development is adequate to run a colossal amount of progenitor reproductions regardless of the fact that it designates one moment portion of its assets to that reason. We can reach this inference even while leaving a considerable room for errors of estimation in every one of our assessments.

Imagine a scenario in which your contemplations and everything a person recognizes is only but bits in a computer simulation intended to satisfy the interest of researchers with capacities beyond anything that is known to humans (Bostrom, 2003). In any case, a few rationalists are taking this thought, called the simulation argument, seriously. Physicists have gone considerably further, recommending that we may even have the capacity to recognize proof that affirms it, that is if we know where to look. Therefore, consider this research as only an introduction to a future concept that will change how businesses are created or built.
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Appendix 1

**Group One Statistical Data**

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</tbody>
</table>
Appendix 2: NetLogo Simulation Codes

turtles-own [ Awareness entrepreneur ;; agentset of nearby turtles
     nearest-neighbor ;; closest one of our entrepreneurs ]
patches-own [ non-usage ]

to setup
  clear-all
  set-default-shape turtles "person"

  crt Business-men
  ask turtles [ set color gray
    set size 1.0
    setxy random-xcor random-ycor set awareness 0]

  crt entrepreneurs
  [ set color red setxy random-xcor random-ycor set awareness 40]

  reset-ticks
end
to go
  ask turtles [ flock ]

  ;; the following line is used to make the turtles
  ;; animate more smoothly.
  repeat 5 [ ask turtles [ fd 0.1 ] display ]
  ;; for greater efficiency, at the expense of smooth
  ;; animation, substitute the following line instead:
  ;;   ask turtles [ fd 1 ]

  ;; adjust awareness according to turtle’s location
  ask turtles
    [ if ( pcolor = 66 ) [ set awareness awareness + 2 ]
    if ( pcolor = black ) [ set awareness awareness - 1 ]
    set non-usage 0 ]

;;=======================================
;;; create centers
ask turtles with [ activist? ]
    [ let open-patches neighbors with [ pcolor = black ]
        if ( any? open-patches )
            [ ask one-of open-patches [ set pcolor 66 ] ]]

;;=======================================
;;Entrepreneurial radial growth effect
ask turtles with [ awareness > 60 ]
    [ ask neighbors4 [ set pcolor 66 ]]

; place limits on the (lower) awareness value
ask turtles with [ awareness > 65 ] [ set awareness 65 ] ;; setting max awareness
ask turtles with [ awareness < 0 ] [ set awareness 0 ] ;; setting minimum awareness

ask patches with [ pcolor != black ] ;;WE WANT NON-USED CENTERS TO DISAPPEAR
    [ if ( not any? turtles-here ) [ set non-usage (non-usage + 3) ]
        if ( non-usage > non-usage-limit ) [ set pcolor black ]
    ]

ask turtles
    [ if awareness >= 35 [ set color red pendown ]] 

ask turtles
    [ if awareness >= 20 and awareness < 35 [ set color blue penup ] ]

ask turtles
    [ if awareness >= 5 and awareness < 20 [ set color yellow ] ]

ask turtles
    [ if awareness < 5 [ set color gray ] ]

tick
end
to flock ;; turtle procedure
find-entrepreneur
if any? entrepreneur
    [ find-nearest-neighbor
        ifelse distance nearest-neighbor < minimum-separation
            [ separate ]
            [ align
                cohere ]
    ]
end

;;--------------------------------------

to find-entrepreneur ;; turtle procedure
    set entrepreneur other turtles in-radius vision with [awareness > 50]
    ;set entrepreneurs other turtles with [awareness > 35]
End

;;--------------------------------------

to find-nearest-neighbor ;; turtle procedure
    set nearest-neighbor min-one-of entrepreneur [distance myself]
end

;;--------------------------------------

;;;; SEPARATE

to separate ;; turtle procedure
    turn-away ([heading] of nearest-neighbor) max-separate-turn
end

;;--------------------------------------

;;;; ALIGN

to align ;; turtle procedure
    turn-towards average-entrepreneur-heading max-align-turn
end

;;--------------------------------------

to-report average-entrepreneur-heading ;; turtle procedure
    ;; We can't just average the heading variables here.
For example, the average of 1 and 359 should be 0, not 180. So we have to use trigonometry.

Let x-component sum [dx] of entrepreneur
Let y-component sum [dy] of entrepreneur
If else x-component = 0 and y-component = 0
  [ report heading ]
  [ report atan x-component y-component ]
end

;;;; COHERE
;;;;=======================================
to cohere ;; turtle procedure
  turn-towards average-heading-towards-entrepreneur max-cohere-turn
end
;;;;=======================================
to report average-heading-towards-entrepreneur ;; turtle procedure
  ;; "towards myself" gives us the heading from the other turtle
  ;; to me, but we want the heading from me to the other turtle,
  ;; so we add 180
  let x-component mean [sin (towards myself + 180)] of entrepreneur
  let y-component mean [cos (towards myself + 180)] of entrepreneur
  if else x-component = 0 and y-component = 0
    [ report heading ]
    [ report atan x-component y-component ]
  end

;;;; HELPER PROCEDURES
;;;;=======================================
to turn-towards [new-heading max-turn] ;; turtle procedure
  turn-at-most (subtract-headings new-heading heading) max-turn
end
;;;;=======================================
to turn-away [new-heading max-turn] ;; turtle procedure
  turn-at-most (subtract-headings heading new-heading) max-turn
end

;; turn right by "turn" degrees (or left if "turn" is negative),
but never turn more than "max-turn" degrees

;=======================================
to turn-at-most [turn max-turn] ;; turtle procedure
    ifelse abs turn > max-turn
        [ ifelse turn > 0
            [ rt max-turn ]
            [ lt max-turn ]
        ]
        [ rt turn ]
    end

;=======================================
to Clear
    clear-turtles
end

;=======================================
to color-turtles
    ask turtles [ ifelse ( activist? ) [ set color red ]
        [ ifelse ( well-informed? ) [ set color blue ]
            [ ifelse ( aware? ) [ set color yellow ]
end

;=======================================
to-report activist?
    report awareness >= 35
end

;=======================================
to-report well-informed?
    report awareness >= 20 and awareness < 35
end

;=======================================
to-report aware?
    report awareness >= 5 and awareness < 20
end
to-report unaware?
  report awareness >= 0 and awareness < 5
end

{:===============================================}

to do-plotting

  set-current-plot "Emerging patterns"
  set-current-plot-pen "Activist Entrepreneurs"
  plot count turtles with [ activist? ]
  set-current-plot-pen "Well-informed Entrepreneurs"
  plot count turtles with [ well-informed? ]
  set-current-plot-pen "Aware Entrepreneurs"
  plot count turtles with [ aware? ]
  set-current-plot-pen "Unaware Entrepreneurs"
  plot count turtles with [ unaware? ]
end
Appendix 3 Graphics

Environment factor groups

Figure EV1: Rate of environmental influence in group two

Figure EV2: Rate of environmental influence in group three

Figure EV3: Rate of environmental influence in group four
Figure EV4: Rate of environmental influence in group five

Figure EV5: Rate of environmental influence in group six

Figure EV6: Rate of environmental influence in group seven
Figure EV7: Rate of environmental influence in group eight

Figure EV8: Rate of environmental influence in group nine

Figure EV9: Rate of environmental influence in group ten
Prior knowledge factor groups

Figure PK1: Frequency of prior knowledge influence in group two

Figure PK2: Frequency of prior knowledge influence in group three

Figure PK3: Frequency of prior knowledge influence in group four
Figure PK4: Frequency of prior knowledge influence in group five

Figure PK5: Frequency of prior knowledge influence in group six

Figure PK6: Frequency of prior knowledge influence in group seven
Figure PK7: Frequency of prior knowledge influence in group eight

Figure PK8: Frequency of prior knowledge influence in group nine

Figure PK9: Frequency of prior knowledge influence in group ten
Personality trait factor groups

Figure PT1: Pattern in frequency of personality trait in group two

Figure PT2: Pattern in frequency of personality trait in group three

Figure PT3: Pattern in frequency of personality trait in group four
Figure PT4: Pattern in frequency of personality trait in group five

Figure PT5: Pattern in frequency of personality trait in group six

Figure PT6: Pattern in frequency of personality trait in group seven
Figure PT7: Pattern in frequency of personality trait in group eight

Figure PT8: Pattern in frequency of personality trait in group nine

Figure PT9: Pattern in frequency of personality trait in group ten
Social network factor groups

Figure SN1: Social network pattern amongst entrepreneurs in group two

Figure SN2: Social network pattern amongst entrepreneurs in group three

Figure SN3: Social network pattern amongst entrepreneurs in group four
Figure SN4: Social network pattern amongst entrepreneurs in group five

Figure SN5: Social network pattern amongst entrepreneurs in group six

Figure SN6: Social network pattern amongst entrepreneurs in group seven
Figure SN7: Social network pattern amongst entrepreneurs in group eight

Figure SN8: Social network pattern amongst entrepreneurs in group nine

Figure SN9: Social network pattern amongst entrepreneurs in group ten
Technology factor groups

Figure TE1: A trace of Technology influence in group two

Figure TE2: A trace of Technology influence in group three

Figure TE3: A trace of Technology influence in group four
Figure TE4: A trace of Technology influence in group five

Figure TE5: A trace of Technology influence in group six

Figure TE6: A trace of Technology influence in group seven
Figure TE7: A trace of Technology influence in group eight

Figure TE8: A trace of Technology influence in group nine

Figure TE9: A trace of Technology influence in group ten
Coherence for Environment factor

Figure CEV1: Group two environmental degree of coherence of entrepreneurs

Figure CEV2: Group three environmental degree of coherence of entrepreneurs

Figure CEV3: Group four environmental degree of coherence of entrepreneurs
Figure CEV4: Group five environmental of coherence of entrepreneurs

Figure CEV5: Group six environmental degree of coherence of entrepreneurs

Figure CEV6: Group seven environmental degree of coherence of entrepreneurs
Figure CEV7: Group eight environmental degree of coherence of entrepreneurs

Figure CEV8: Group nine environmental degree of coherence of entrepreneurs

Figure CEV9: Group one environmental degree of coherence of entrepreneurs
Coherency for Prior knowledge factor

Figure CPK1: Prior knowledge coherence among entrepreneurs in group two

Figure CPK2: Prior knowledge coherence among entrepreneurs in group three

Figure CPK3: Prior knowledge coherence among entrepreneurs in group four
Figure CPK4: Prior knowledge coherence among entrepreneurs in group five

Figure CPK5: Prior knowledge coherence among entrepreneurs in group six

Figure CPK6: Prior knowledge coherence among entrepreneurs in group seven
Figure CPK7: Prior knowledge coherence among entrepreneurs in group eight

Figure CPK8: Prior knowledge coherence among entrepreneurs in group nine

Figure CPK9: Prior knowledge coherence among entrepreneurs in group ten
Coherency for Personality Trait factor

Figure CPT1: Personality trait coherence among entrepreneurs in group two

Figure CPT2: Personality trait coherence among entrepreneurs in group three

Figure CPT3: Personality trait coherence among entrepreneurs in group four
Figure CPT4: Personality trait coherence among entrepreneurs in group five

Figure CPT5: Personality trait coherence among entrepreneurs in group six

Figure CPT6: Personality trait coherence among entrepreneurs in group seven
Figure CPT7: Personality trait coherence among entrepreneurs in group eight

Figure CPT8: Personality trait coherence among entrepreneurs in group nine

Figure CPT9: Personality trait coherence among entrepreneurs in group ten
Coherency for Social Network factor

Figure CSN1: Coherency patterns observed in Social network in group two

Figure CSN2: Coherency patterns observed in Social network in group three

Figure CSN3: Coherency patterns observed in Social network in group four
Figure CSN4: Coherency patterns observed in Social network in group five

Figure CSN5: Coherency patterns observed in Social network in group six

Figure CSN6: Coherency patterns observed in Social network in group seven
Figure CSN7: Coherency patterns observed in Social network in group eight

Figure CSN8: Coherency patterns observed in Social network in group nine

Figure CSN9: Coherency patterns observed in Social network in group ten
Coherency for Technology factor

Figure CT1: Technology attribute coherency patterns observed in group two

Figure CT2 Technology attribute coherency patterns observed in group three

Figure CT3: Technology attribute coherency patterns observed in group four
Figure CT4: Technology attribute coherency patterns observed in group five

Figure CT5: Technology attribute coherency patterns observed in group six

Figure CT6: Technology attribute coherency patterns observed in group seven
Figure CT7: Technology attribute coherency patterns observed in group eight

Figure CT8: Technology attribute coherency patterns observed in group nine

Figure CT9: Technology attribute coherency patterns observed in group ten
Appendix 4: Visual C-Sharp Simulation Codes

Main Form

using  System;
using  System.Collections.Generic;
using  System.ComponentModel;
using  System.Data;
using  System.Drawing;
using  System.Linq;
using  System.Text;
using  System.Windows.Forms;
using  Microsoft.Office.Interop.Excel;
using  System.Collections;

namespace  Entrepreneur_Opportunity_Application
{
    public  partial  class  Form1  :  Form
    {
        public  Form2  Tech;
        public  Form3  Environ;
        public  Form4  SocialNet;
        public  Form5  Prior;
        public  Form6  Personality;
        public  Form7  Graphs;

        ArrayList  Technologylist  =  new  ArrayList();
        ArrayList  Environmentlist  =  new  ArrayList();
        ArrayList  SocialNetworklist  =  new  ArrayList();
        ArrayList  PriorKnowledgelist  =  new  ArrayList();
        ArrayList  PersonalityTraitlist  =  new  ArrayList();
        ArrayList  OpportunityEmergencelist  =  new  ArrayList();

        //public  int  SimSpeed  =  5;
        public  Form1()
        {
            InitializeComponent();
            Tech  =  new  Form2()  {  Owner  =  this  };
            Environ  =  new  Form3()  {  Owner  =  this  };
            SocialNet  =  new  Form4()  {  Owner  =  this  };
            Prior  =  new  Form5()  {  Owner  =  this  };
            Personality  =  new  Form6()  {  Owner  =  this  };
            Graphs  =  new  Form7()  {  Owner  =  this  };
        }

        private  void  label1_Click(object  sender,  EventArgs  e)
        {
        }

        private  void  trackBar1_Scroll(object  sender,  EventArgs  e)
        {
            //trackBar1.Value  =  1;
            //SimSpeed  =  trackBar1.Value  *10;
            //textBox1.Text  =  SimSpeed.ToString();
        }

        private  void  button1_Click(object  sender,  EventArgs  e)
        {
            Form2  Tech  =  new  Form2();
        }
    }
}
private void button2_Click(object sender, EventArgs e)
{
    Form3 SocialNet = new Form3();
    SocialNet.Show();
}

private void button3_Click(object sender, EventArgs e)
{
    Form4 Environment = new Form4();
    Environment.Show();
}

private void button4_Click(object sender, EventArgs e)
{
    Form5 Personality = new Form5();
    Personality.Show();
}

private void button5_Click(object sender, EventArgs e)
{
    Form6 PriorKnow = new Form6();
    PriorKnow.Show();
}

private void button6_Click(object sender, EventArgs e)
{
    this.Close();
}

private void scenariosToolStripMenuItem_Click(object sender, EventArgs e)
{
}

private void ExportSimButton_Click(object sender, EventArgs e)
{
    Workbook wb = xla.Workbooks.Add(XlSheetType.xlWorksheet);
    Worksheet ws = (Worksheet)xla.ActiveSheet;
    for (int i = 0; i < Tech.Count2; i++)
    {
        ws.Cells[1, 1] = "Technology";
        ws.Cells[1, 2] = "Environment";
        ws.Cells[1, 3] = "SocialNetwork";
        ws.Cells[1, 4] = "PriorKnowledge";
        ws.Cells[1, 5] = "PersonalityTrait";
        ws.Cells[1, 6] = "OpportunityEmergence";

        ws.Cells[i + 2, 1] = TechnologyList[i];
        ws.Cells[i + 2, 2] = EnvironmentList[i];
        ws.Cells[i + 2, 3] = SocialNetworkList[i];
        ws.Cells[i + 2, 4] = PriorKnowledgeList[i];
        ws.Cells[i + 2, 5] = PersonalityTraitList[i];
        ws.Cells[i + 2, 6] = OpportunityEmergenceList[i];
    }
    xla.Visible = true;
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
using System.Collections;
using Microsoft.Office.Interop.Excel;

namespace Entrepreneur_Opportunity_Application
{
    public partial class Form2 : Form
    {
        public Form7 Graph;
        public Form2()
        {
            InitializeComponent();
            Graph = new Form7() { Owner = this };
        }

        public void Form2_Load(object sender, EventArgs e)
        {
        }

        public Double num1;
        public Double num2;
        public Double num3;
        public Double num4;
        public Double num5;

        private void chart1_Click(object sender, EventArgs e)
        {
        }

        private void Form1_Load(object sender, EventArgs e)
        {
        }

        private void Maintimer_Tick(object sender, EventArgs e)
        {
            Technologylist.Add(TEtextBox.Text);
            Environmentlist.Add(EEtextBox.Text);
            SocialNetworklist.Add(SNEtextBox.Text);
            PersonalityTraitlist.Add(PTEtextBox.Text);
            PriorKnowledgelist.Add(PKEtextBox.Text);
            OpportunityEmergencelist.Add(OEtextBox.Text);
        }

        private void button7_Click(object sender, EventArgs e)
        {
            Maintimer.Start();
        }
    }

    Technology

    using System;
    using System.Collections.Generic;
    using System.ComponentModel;
    using System.Data;
    using System.Drawing;
    using System.Linq;
    using System.Text;
    using System.Windows.Forms;
    using System.Collections;
    using Microsoft.Office.Interop.Excel;

    namespace Entrepreneur_Opportunity_Application
    {
        public partial class Form2 : Form
        {
            public Form7 Graph;
            public Form2()
            {
                InitializeComponent();
                Graph = new Form7() { Owner = this };
            }

            public void Form2_Load(object sender, EventArgs e)
            {
            }

            public Double num1;
            public Double num2;
            public Double num3;
            public Double num4;
            public Double num5;

            private void chart1_Click(object sender, EventArgs e)
            {
            }

            private void Form1_Load(object sender, EventArgs e)
            {
            }

            private void Maintimer_Tick(object sender, EventArgs e)
            {
                Technologylist.Add(TEtextBox.Text);
                Environmentlist.Add(EEtextBox.Text);
                SocialNetworklist.Add(SNEtextBox.Text);
                PersonalityTraitlist.Add(PTEtextBox.Text);
                PriorKnowledgelist.Add(PKEtextBox.Text);
                OpportunityEmergencelist.Add(OEtextBox.Text);
            }

            private void button7_Click(object sender, EventArgs e)
            {
                Maintimer.Start();
            }
        }
    }
public Double num6;
public Double num7;

ArrayList InitiativeList = new ArrayList();
ArrayList InnovationList = new ArrayList();
ArrayList InventionList = new ArrayList();
ArrayList ResearchList = new ArrayList();
ArrayList ErrorFactorList = new ArrayList();
ArrayList TechEmergencyList = new ArrayList();

private void button1_Click(object sender, EventArgs e)
{
    this.Close();
}

private void button2_Click(object sender, EventArgs e)
{
    TechTimer.Start();
    // Graph.Show();
}

public int count1 = 0;
public int count2 = 100;

public void Techchart()
{
    this.chart1.Series["Initiative"].Points.AddXY(count1, num1*num5/5);
    this.chart1.Series["Innovation"].Points.AddXY(count1, num2*num5/5);
    this.chart1.Series["Invention"].Points.AddXY(count1, num3*num5/5);
    this.chart1.Series["Research"].Points.AddXY(count1, num4*num5/5);
    this.chart1.Series["Others"].Points.AddXY(count1, num5);
    this.chart1.Series["Technology Emergence"].Points.AddXY(count1, ((num1/5 + num2/5 + num3/5 + num4/5)/4)*num5));
}

private void Techtimer_Tick(object sender, EventArgs e)
{
    System.Random random = new System.Random();
    num1 = random.Next(1, 6);
    num2 = random.Next(1, 6);
    num3 = random.Next(1, 6);
    num4 = random.Next(1, 6);
    num5 = 0.95;
    num6 = ((num1*num5/5) + (num2*num5/5) + (num3*num5/5) + (num4*num5/5))/4;
    num7 = (num6);
    textBox1.Text = (num1*num5/5).ToString();
    textBox2.Text = (num2*num5/5).ToString();
    textBox3.Text = (num3*num5/5).ToString();
    textBox4.Text = (num4*num5/5).ToString();
    textBox5.Text = num5.ToString();
    TechemergencyTextBox.Text = num7.ToString();
    Techchart();
    Graph.Techgraph();
}

}
if (count1 < count2)
{
    count1++;
    TechTimer.Start();
}

else
{
    TechTimer.Stop();
    ButtonExportToExcel.Enabled = true;
}

Initiativelist.Add(num1*num5/5);
Innovationlist.Add(num2*num5/5);
Inventionlist.Add(num3*num5/5);
Researchlist.Add(num4*num5/5);
ErrorFactorlist.Add(num5);
TechEmergencelist.Add(num7);

private void ButtonExportToExcel_Click(object sender, EventArgs e)
{
    Workbook wb = xla.Workbooks.Add(XlSheetType.xlWorksheet);
    Worksheet ws = (Worksheet)xla.ActiveSheet;

    for (int i = 0; i < count2; i++)
    {
        ws.Cells[1, 1] = "Initiative";
        ws.Cells[1, 2] = "Innovation";
        ws.Cells[1, 3] = "Invention";
        ws.Cells[1, 4] = "Research";
        ws.Cells[1, 5] = "ErrorFactor";
        ws.Cells[1, 6] = "TechEmergence";

        ws.Cells[i + 2, 1] = Initiativelist[i];
        ws.Cells[i + 2, 2] = Innovationlist[i];
        ws.Cells[i + 2, 3] = Inventionlist[i];
        ws.Cells[i + 2, 4] = Researchlist[i];
        ws.Cells[i + 2, 5] = ErrorFactorlist[i];
        ws.Cells[i + 2, 6] = TechEmergencelist[i];

        xla.Visible = true;
    }
}

Social Network

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
using Microsoft.Office.Interop.Excel;
using System.Collections;
namespace Entrepreneur_Opportunity_Application
{
    public partial class Form3 : Form
    {
        public Form7 Graph;
        public Form3()
        {
            InitializeComponent();
            Graph = new Form7() { Owner = this };  
        }
        public Double num1;
        public Double num2;
        public Double num3;
        public Double num4;
        public Double num5;
        public Double num6;

        ArrayList Educationlist = new ArrayList();
        ArrayList Incomelist = new ArrayList();
        ArrayList Familylist = new ArrayList();
        ArrayList ErrorFactorlist = new ArrayList();
        ArrayList SNEmergencelist = new ArrayList();

        public void Socialchart()
        {
            this.chart2.Series["Education"].Points.AddXY(count1, num1*num4/5);
            this.chart2.Series["Income"].Points.AddXY(count1, num2*num4/5);
            this.chart2.Series["Family"].Points.AddXY(count1, num3*num4/7);
            this.chart2.Series["Others"].Points.AddXY(count1, num4);
            this.chart2.Series["Social Network"].Points.AddXY(count1, num6);
        }
        private void button1_Click(object sender, EventArgs e)
        {
            this.Close();
        }
        private void Form3_Load(object sender, EventArgs e)
        {
        }
        private void button2_Click(object sender, EventArgs e)
        {
            SocialNetTimer.Start();
        }
        public int count1 = 0;
        public int count2 = 100;
        private void timer1_Tick(object sender, EventArgs e)
        {
            System.Random random = new System.Random();
            num1 = random.Next(1, 6);
            num2 = random.Next(1, 6);
            num3 = random.Next(1, 8);
            num4 = 0.95;
            num5 = ((num1*num4/5 + num2*num4/5 + num3*num4/7)/3);
            num6 = (num5);
            textBox1.Text = (num1*num4/5).ToString();
        }
    }
}
textBox2.Text = (num2*num4/5).ToString();
textBox3.Text = (num3*num4/7).ToString();
textBox4.Text = num4.ToString();
SNEmergencetextBox.Text = num6.ToString();

Socialchart();
Graph.Socialgraph();

if (count1 < count2)
{
    count1++;
    SocialNetTimer.Start();
}
else
{
    SocialNetTimer.Stop();
    Export2ExcelButton.Enabled = true;
}

Educationlist.Add(num1*num4/5);
Incomelist.Add(num2*num4/5);
Familylist.Add(num3*num4/7);
ErrorFactorlist.Add(num4);
SNEmergencelist.Add(num6);

private void Export2ExcelButton_Click(object sender, EventArgs e)
{
    Workbook wb = xla.Workbooks.Add(XlSheetType.xlWorksheet);
    Worksheet ws = (Worksheet)xla.ActiveSheet;
    for (int i = 0; i < count2; i++)
    {
        ws.Cells[1, 1] = "Education";
        ws.Cells[1, 2] = "Income";
        ws.Cells[1, 3] = "Family";
        ws.Cells[1, 4] = "ErrorFactor";
        ws.Cells[1, 5] = "SNEmergence";
        ws.Cells[i + 2, 1] = Educationlist[i];
        ws.Cells[i + 2, 2] = Incomelist[i];
        ws.Cells[i + 2, 3] = Familylist[i];
        ws.Cells[i + 2, 4] = ErrorFactorlist[i];
        ws.Cells[i + 2, 5] = SNEmergencelist[i];
    }
    xla.Visible = true;
}

Environment

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
using System.Collections;
using Microsoft.Office.Interop.Excel;

namespace Entrepreneur_Opportunity_Application
{
    public partial class Form4 : Form
    {
        public Form4()
        {
            InitializeComponent();
        }

        public Double a;
        public Double b;
        public Double c;
        public Double d;
        public Double g;
        public Double f;
        public Double j;

        ArrayList Politicallist = new ArrayList();
        ArrayList Developmentlist = new ArrayList();
        ArrayList Culturelist = new ArrayList();
        ArrayList Economylist = new ArrayList();
        ArrayList ErrorFactorlist = new ArrayList();
        ArrayList EEmergencelist = new ArrayList();

        private void button1_Click(object sender, EventArgs e)
        {
            this.Close();
        }

        private void Form4_Load(object sender, EventArgs e)
        {
        }

        private void button2_Click_1(object sender, EventArgs e)
        {
            EnvironmentTimer.Start();
        }

        public int count1 = 0;
        public int count2 = 100;

        private void timer1_Tick(object sender, EventArgs e)
        {
            System.Random random = new System.Random();
            a = random.Next(1, 5);
            b = random.Next(1, 6);
            c = random.Next(1, 6);
            d = random.Next(1, 6);
            g = 0.95;
            f = (a * g / 4 + b * g / 5 + c * g / 5 + d * g / 5) / 4;
            j = (f);

            textBox1.Text = (a * g / 4).ToString();
            textBox2.Text = (b * g / 5).ToString();
            textBox3.Text = (c * g / 5).ToString();
            textBox4.Text = (d * g / 5).ToString();
            textBox5.Text = g.ToString();
            EEmergencetextBox.Text = j.ToString();
        }
    }
}
this.chart1.Series["Political"].Points.AddXY(count1, a*g/4);
this.chart1.Series["Development"].Points.AddXY(count1, b*g/5);
this.chart1.Series["Culture"].Points.AddXY(count1, c*g/5);
this.chart1.Series["Economy"].Points.AddXY(count1, d*g/5);
this.chart1.Series["Others"].Points.AddXY(count1, g);
this.chart1.Series["Environment"].Points.AddXY(count1, j));

if (count1 < count2)
{
    count1++;
    EnvironmentTimer.Start();
}
else
{
    EnvironmentTimer.Stop();
    ExportButton.Enabled = true;
}

Politicallist.Add(a*g/4);
Developmentlist.Add(b*g/5);
Culturelist.Add(c*g/5);
Economylist.Add(d*g/5);
ErrorFactorlist.Add(g);
EEmergencelist.Add(j);

private void ExportButton_Click(object sender, EventArgs e)
{
    Workbook wb = xla.Workbooks.Add(XlSheetType.xlWorksheet);
    Worksheet ws = (Worksheet)xla.ActiveSheet;

    for (int i = 0; i < count2; i++)
    {
        ws.Cells[1, 1] = "Political";
        ws.Cells[1, 2] = "Development";
        ws.Cells[1, 3] = "Culture";
        ws.Cells[1, 4] = "Economy";
        ws.Cells[1, 5] = "ErrorFactor";
        ws.Cells[1, 6] = "EEmergence";

        ws.Cells[i + 2, 1] = Politicallist[i];
        ws.Cells[i + 2, 2] = Developmentlist[i];
        ws.Cells[i + 2, 3] = Culturelist[i];
        ws.Cells[i + 2, 4] = Economylist[i];
        ws.Cells[i + 2, 5] = ErrorFactorlist[i];
        ws.Cells[i + 2, 6] = EEmergencelist[i];

        xla.Visible = true;
    }

}
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
using System.Collections;
using Microsoft.Office.Interop.Excel;

namespace Entrepreneur_Opportunity_Application
{
    public partial class Form5 : Form
    {
        public Form5()
        {
            InitializeComponent();
        }
        public Double num1;
        public Double num2;
        public Double num3;
        public Double num4;
        public Double num5;
        public Double num6;
        public Double num7;
        public Double num8;
        public Double num9;
        public Double num10;
        public Double num11;

        ArrayList IQlist = new ArrayList();
        ArrayList LeadershipSkillslist = new ArrayList();
        ArrayList Creativitylist = new ArrayList();
        ArrayList Responsivenesslist = new ArrayList();
        ArrayList RiskTolerancelist = new ArrayList();
        ArrayList Curiositylist = new ArrayList();
        ArrayList Passionlist = new ArrayList();
        ArrayList Persistencelist = new ArrayList();
        ArrayList ErrorFactorlist = new ArrayList();
        ArrayList PTEmergencelist = new ArrayList();

        private void button1_Click(object sender, EventArgs e)
        {
            this.Close();
        }

        private void button2_Click(object sender, EventArgs e)
        {
            PersonTraitTimer.Start();
        }

        public int count1 = 0;
        public int count2 = 100;

        private void PersonTraitTimer_Tick(object sender, EventArgs e)
        {
            System.Random random = new System.Random();

            num1 = random.Next(1, 6);
            num2 = random.Next(1, 6);
num3 = random.Next(1, 6);
num4 = random.Next(1, 6);
num5 = random.Next(1, 6);
num6 = random.Next(1, 6);
num7 = random.Next(1, 6);
num8 = random.Next(1, 6);
num9 = 0.95;
num10 = (num1*num9/5 + num2*num9/5 + num3*num9/5 + num4*num9/5 +
num5*num9/5 + num6*num9/5 + num7*num9/5 + num8*num9/5)/8;
num11 = num10;
textBox1.Text = (num1*num9/5).ToString();
textBox2.Text = (num2*num9/5).ToString();
textBox3.Text = (num3*num9/5).ToString();
textBox4.Text = (num4*num9/5).ToString();
textBox5.Text = (num5*num9/5).ToString();
textBox6.Text = (num6*num9/5).ToString();
textBox7.Text = (num7*num9/5).ToString();
textBox8.Text = (num8*num9/5).ToString();
PTETextBox.Text = num11.ToString();
{
    this.chart1.Series["IQ"].Points.AddXY
        (count1, num1*num9/5);
    this.chart1.Series["Leadership Skills"].Points.AddXY
        (count1, num2*num9/5);
    this.chart1.Series["Creativity"].Points.AddXY
        (count1, num3*num9/5);
    this.chart1.Series["Responsiveness"].Points.AddXY
        (count1, num4*num9/5);
    this.chart1.Series["Risk Tolerance"].Points.AddXY
        (count1, num5*num9/5);
    this.chart1.Series["Curiosity"].Points.AddXY
        (count1, num6*num9/5);
    this.chart1.Series["Passion"].Points.AddXY
        (count1, num7*num9/5);
    this.chart1.Series["Persistence"].Points.AddXY
        (count1, num8*num9/5);
    this.chart1.Series["Others"].Points.AddXY
        (count1, num9);
    this.chart1.Series["Personality Trait"].Points.AddXY
        (count1, num11);
}
{
    if (count1 < count2)
    {
        count1++;
        PersonTraitTimer.Start();
    }
    else
    {
        PersonTraitTimer.Stop();
        ExportPTE2ExcelButton.Enabled = true;
    }
}
IQlist.Add(num1*num9/5);
LeadershipSkillslist.Add(num2*num9/5);
Creativitylist.Add(num3*num9/5);
Responsivenesslist.Add(num4*num9/5);
RiskTolerancelist.Add(num5*num9/5);
Curiositylist.Add(num6*num9/5);
Passionlist.Add(num7*num9/5);
Persistencelist.Add(num8*num9/5);
ErrorFactorlist.Add(num9);
PTEmergencelist.Add(num11);

private void ExportPTE2ExcelButton_Click(object sender, EventArgs e)
{
    Workbook wb = xla.Workbooks.Add(XlSheetType.xlWorksheet);
    Worksheet ws = (Worksheet)xla.ActiveSheet;
    for (int i = 0; i < count2; i++)
    {
        ws.Cells[1, 1] = "IQ";
        ws.Cells[1, 2] = "Leadership Skills";
        ws.Cells[1, 3] = "Creativity";
        ws.Cells[1, 4] = "Responsiveness";
        ws.Cells[1, 5] = "Risk Tolerance";
        ws.Cells[1, 6] = "Curiosity";
        ws.Cells[1, 7] = "Passion";
        ws.Cells[1, 8] = "Persistence";
        ws.Cells[1, 9] = "ErrorFactor";
        ws.Cells[1, 10] = "PTEmergence";
        ws.Cells[i + 2, 1] = IQlist[i];
        ws.Cells[i + 2, 2] = LeadershipSkillslist[i];
        ws.Cells[i + 2, 3] = Creativitylist[i];
        ws.Cells[i + 2, 4] = Responsivenesslist[i];
        ws.Cells[i + 2, 5] = RiskTolerancelist[i];
        ws.Cells[i + 2, 6] = Curiosi
        ws.Cells[i + 2, 7] = Passionlist[i];
        ws.Cells[i + 2, 8] = Persistencelist[i];
        ws.Cells[i + 2, 9] = ErrorFactorlist[i];
        ws.Cells[i + 2, 10] = PTEmergencelist[i];
    }
    xla.Visible = true;
}

Prior Knowledge

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
using System.Collections;
using Microsoft.Office.Interop.Excel;

namespace Entrepreneur_Opportunity_Application
{
    public partial class Form6 : Form
    {
        public Form6()
        {
            InitializeComponent();
        }
    }
}
public Double X;
public Double Y;
public Double Z;
public Double V;
public Double U;

ArrayList EducationList = new ArrayList();
ArrayList ExperienceList = new ArrayList();
ArrayList ErrorFactorList = new ArrayList();
ArrayList PKEmergencyList = new ArrayList();

private void button1_Click(object sender, EventArgs e)
{
    this.Close();
}

private void button2_Click(object sender, EventArgs e)
{
    PriorKnowTimer.Start();
}

public int count1 = 0;
public int count2 = 100;

private void PriorKnowTimer_Tick(object sender, EventArgs e)
{
    System.Random random = new System.Random();

    X = random.Next(1, 8);
    Y = random.Next(1, 6);
    Z = 0.95;
    V = (X*Z/7 + Y*Z/5)/2;
    U = V;

    textBox1.Text = (X*Z/7).ToString();
    textBox2.Text = (Y*Z/5).ToString();
    textBox3.Text = Z.ToString();
    PKETextBox.Text = U.ToString();

    this.chart1.Series["Education"].Points.AddXY(count1, X*Z/7);
    this.chart1.Series["Experience"].Points.AddXY(count1, Y*Z/5);
    this.chart1.Series["Others"].Points.AddXY(count1, Z);
    this.chart1.Series["Prior Knowledge"].Points.AddXY(count1, U);

    if (count1 < count2)
    {
        count1++;
        PriorKnowTimer.Start();
    }

    else
    {
        PriorKnowTimer.Stop();
PKEExportButton.Enabled = true;
    }
}

EducationList.Add(X*Z/7);
ExperienceList.Add(Y*Z/5);
ErrorFactorList.Add(Z);
PKEmergencyList.Add(U);
private void PKEExportButton_Click(object sender, EventArgs e)
{
    Workbook wb = xla.Workbooks.Add(XlSheetType.xlWorksheet);
    Worksheet ws = (Worksheet)xla.ActiveSheet;
    for (int i = 0; i < count2; i++)
    {
        ws.Cells[1, 1] = "Education";
        ws.Cells[1, 2] = "Experience";
        ws.Cells[1, 3] = "ErrorFactor";
        ws.Cells[1, 4] = "PKEmergence";
        ws.Cells[i + 2, 1] = Educationlist[i];
        ws.Cells[i + 2, 2] = Experiencelist[i];
        ws.Cells[i + 2, 3] = ErrorFactorlist[i];
        ws.Cells[i + 2, 4] = PKEmergencelist[i];
    }
    xla.Visible = true;
}

namespace Entrepreneur_Opportunity_Application {
    public partial class Form7 : Form {
        public Form7()
        {
            InitializeComponent();
        }
        public void Techgraph()
        {
            Form2 mainform = ((Form2)this.Owner);
            this.chart1.Series["Innitiative"].Points.AddXY(mainform.count1, mainform.num1);
            this.chart1.Series["Innovation"].Points.AddXY(mainform.count1, mainform.num2);
            this.chart1.Series["Invention"].Points.AddXY(mainform.count1, mainform.num3);
            this.chart1.Series["Research"].Points.AddXY(mainform.count1, mainform.num4);
            this.chart1.Series["Others"].Points.AddXY(mainform.count1, mainform.num5);
            this.chart1.Series["Technology Emergence"].Points.AddXY(mainform.count1, (mainform.num1 * mainform.num2 * mainform.num3 * mainform.num5 / mainform.num6));
        }
    }
}
public void Socialgraph()
{
    Form3 mainform = ((Form3)this.Owner);

    this.chart2.Series["Education"].Points.AddXY
        (mainform.count1, mainform.num1);
    this.chart2.Series["Income"].Points.AddXY
        (mainform.count1, mainform.num2);
    this.chart2.Series["Family"].Points.AddXY
        (mainform.count1, mainform.num3);
    this.chart2.Series["Others"].Points.AddXY
        (mainform.count1, mainform.num4);
    this.chart2.Series["Social Emergence"].Points.AddXY
        (mainform.count1, (mainform.num1 * mainform.num2 * 
        mainform.num3 / mainform.num5));

    private void chart1_Click(object sender, EventArgs e)
    {
    }

    private void Form7_Load(object sender, EventArgs e)
    {
    }

    private void button1_Click(object sender, EventArgs e)
    {
        this.Hide();
    }

    }
}