

Gaining Competitive Edge with a Comprehension of Complex System of Self-Organized Startup Businesses

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How to cite this paper: Dodor, A., & Akolgo, I. G. (2022). Gaining Competitive Edge with a Comprehension of Complex System of Self-Organized Startup Businesses. *Open Journal of Business and Management*, 10, 2553-2577.

<https://doi.org/10.4236/ojbm.2022.105127>

Received: August 6, 2022

Accepted: September 17, 2022

Published: September 20, 2022

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Abstract

Design/Methodology/Approach: System dynamics with the use of Vensim software was used to depict the various variables used in the study, and Structural Equation Modelling (SEM) assisted in analyzing the data with a sample size of 350 responses, depicting that all the measurement models and constructs used fit the data well. **Purpose:** The study aimed at investigating how self-organised startups can differentiate themselves by understanding the theory of complex adaptive system for a competitive edge. This study builds on complexity theory which is a system grounded on relationships, emergence and patterns. The major problem that has led to this research is the inability of entrepreneurs to gain competitive edge over their competitors leading to high startup chaos and failures. Startups that are seen as systems and managed well can gain competitive edge, compared to their rival startups which are not recognised as a set of systems to strategically organise and reorder regularly. **Findings:** The three exogenous variables, namely opportunities, resources and experience which were hypothesised all came up as having positive and significant relationships with competitive edge which was the mediating variable, while the mediating variable was also statistically significant to the dependent variable—startup business. **Research Limitations/Implications:** The study was conducted in a cross-sectional base and could not capture the trend in the actions of the entrepreneurs used in the research in terms of their competitive edge. In the future, researchers can expand their focus by conducting longitudinal studies in this area to analyze how competitive edge influences self-organised startups over time. Attention was not paid to the competitive edge of the entrepreneurs in relation to specific organising activities. In this regard, studies that seek to examine how competitive edge influences specific organising activities of these entrepreneurs in the future

will further enhance the understanding of self-organising entrepreneur startups. **Practical Implications:** The study will help identify a pool of potential startup innovators and provide special support to this group to help overcome the particular constraints they encounter in terms of management skills development, growth, finance, finding partners in external markets, linking into an innovation support infrastructure and accessing appropriate premises. Regulators, through this study, will streamline policies relating to entrepreneurship for an improved economy. It will facilitate specialisation, high profitability, economies of scale, human and financial synergetic environment and innovative performance.

Keywords

Competitive Edge, Complex Adaptive System, Self-Organised Startups, RBV

1. Introduction

It is crucial for startups to scrutinise their environment for opportunities and threats in order to establish where they can gain competitive advantage and where their resources might most usefully be concentrated (Chadwick & Flinchbaugh, 2021; Pearson, Pitfield, & Ryley, 2015). The more turbulent the environment is, the more forceful the firm must be (Alexiev, Volberda, & Van den Bosch, 2016; Qiu, Hu, & Wang, 2020) in terms of competitive strategies and entrepreneurial activities or change orientation for success and good performance. The traditional Startup is the “initial days in the life cycle of a business where the entrepreneur moves from the idea stage to acquiring financing, laying down the elementary structure of the business, and initiating operations or transaction” (Kárpáti-Daróczy & Karlovitz, 2020). Self-Organisation startup is a process which is slightly different, in that it is moved from an initially disordered system to an ordered system (Arévalo & Espinosa, 2015) which can result in competitive edge. In this paper, the term “self-organised” is referred to a self-setup business venture which is seen as an organised system made up of individuals who have capabilities and who interact constantly with each other to produce core competencies. The individuals in the organisation are like tiny elements in a virtual system who communicate and give feedback to each other to spontaneously emerge from chaotic situations. The elements can adapt to their environment by transforming and self-organising while conforming to change (Carpenter & Grossberg, 2016).

The organised system should be open. Closed system will automatically go to entropy increase and engender disorder. Only open system can constantly exchange material, energy and information with the external environment and change the system from disorder to order. The entrepreneur with an opened system will partner with other specialised people to gain competitive edge.

Competitive edge is anything that a firm does, especially well compared to ri-

val firms (Chadwick & Flinchbaugh, 2021; Schilke, 2014). When a firm can do something that a rival firm cannot do or owns something that rival firms desire, that can represent a competitive advantage. Normally, a firm can sustain a competitive advantage for only a certain period due to rival firms imitating and undermining that advantage. Thus, it is not adequate to simply obtain competitive advantage; it should be sustained to deter competitors.

For startups to gain competitive advantage, the fundamental bases are its resources. This study builds on Resource Base View (RBV) theory which is an appropriate theory because it is a managerial framework used to determine an organisation's internal resources with the potential to acquire competitive edge. The theory assumes that resources are unique in that, different firms have different resources and that it may be costly for firms without certain resources to acquire and develop them. It indicates that some resources may not spread from firm to firm easily. Thus, resources are heterogeneous and immobile. However, resources being heterogeneous and immobile are not enough for startups to gain competitive edge. Resources of firms, as depicted in a framework created by Erevelles, Fukawa, & Swayne (2016) should be valuable, rare, difficult to imitate and organised (Erevelles, Fukawa, & Swayne, 2016). This can enable a firm to gain competitive edge. RBV theory holds that competitive edge is created and sustained when the resources and capabilities possesses VRIO (valuable, rare, imitable, organised) attributes. That is, the VRIO framework poses the question for Valuable resources, "Do the resources support the firm to exploit an external opportunity or nullify an external threat?" Rarity means the control of resources or capability is in the hands of a relative few, or else perfect competition will set in. Competitive edge of valuable and rare resources can be sustained only if competitors realise that it is too costly to imitate the resources. Intangible resources are usually costlier to imitate than tangible resources. Finally, firms' structure and control mechanisms must be aligned so as to give people the ability and the incentive to exploit firms' resources. All these attributes coming together will assist a firm to have a competitive edge over its competitors. In the book, *The Theory of the Growth of the Firm* (Penrose & Penrose, 2009) which led to the genesis of RBV, the Penrose and Penrose advocate that the growth of the firm centers on the fact that the entrepreneur sees opportunities for expansion and is willing to act upon them; such act is hinged on entrepreneurial intuition and imagination for competitive edge.

This study aims to answer the following overarching research question: RQ—how can competitive edge be gained by self-organised startup businesses? The major problem that has led to this research is the inability of entrepreneurs to gain competitive edge over their competitors leading to high startup chaos and failures. Startups that are seen as complex systems with well managed tangible and intangible resources and capabilities can gain competitive edge (Garg & Gupta, 2021; Pearson et al., 2015) compared to their rival startups which are not recognised as a set of systems to strategically organise and reorder regularly

(Kaya, 2015). Well-organised startups stand tall among their rivals, making them different and giving them the ability to earn surplus return for their shareholders (Othman et al., 2015). In attaining competitive edge, the firm has to create value by executing one or more value creation events in a way that generates more overall value than do rivals (Lee, Park, & Park, 2020; Kaya, 2015). Greater value is produced through lower cost or applying differentiation. The absence of competitive edge limits the startups reason to exist, thus making it prone to folding up (Schilke, 2014). Startups needs distinct competencies, hence the ability to see opportunities, have requisite resources coupled with intense experience from entrepreneurs and team for excellent performance.

The study aims at investigating how self-organised startups can differentiate themselves by understanding complex systems of firms for a competitive edge and successful performance. The research question is how significant is “competitive edge” for entrepreneurs who venture into self-organised startup businesses? Based on the above question, an objective was formulated to investigate the significance of “competitive edge” as a mediating variable between trigger factors (opportunities, resources, experience) and self-organised startup business.

The article is organized as follows. The above introduction is followed by the literature review and the theories used to underpin the research. A startup model using Vensim software was examined followed by the methodology that includes sampling analysis, reliability and validity check. Findings and data analysis was thoroughly done before discussion and conclusions of the study. The last bit of the study deals with implications, emerging trends, limitations and further studies.

2. Literature Review

2.1. Resource Based Theory (RBT)

A Firm’s competitive edge is affected by the resources and capabilities that are available to it. Organisations’ resources are categorised into human capital, financial, physical and organisational (Chadwick & Flinchbaugh, 2021). The RBV posits that a firm’s internal resources are the primary predictors of greater financial resources. The fundamental issue to identify and exploit resources effectively in the firm is to have a competitive edge (Barney, 2014; Kirui, 2020). RBV is also referred to as the “inside-out” view. This is because it takes its strength from inside the firm and draws capabilities and resources that reside in the firm to gain competitive advantage. In his analysis of RBT and Lean Six Sigma (LSS) which he describes as the most widely used business improvement initiative, Sony (2019) suggests that application of RBT can add richness to an organisation, which will bring practical implications for forming the resource-based strategy in the organization, thereby leading to competitive advantage.

RBV has advanced two assumptions that resources are heterogeneous and

immobile. These assumptions mean that if one firm has resources that are valuable and other firms which do not have same resources imitate these resources without incurring high cost, then the firm possessing the valuable resources will likely gain competitive advantage (Bromiley & Rau, 2016). Capabilities are also a subset of resources that enable a firm to take full advantage of other resources such as marketing skills and cooperate relationships (Dovidio, Piliavin, Schroeder, & Penner, 2017). RBV indicates that if a firm has VRIO (valuable, rarity, imitable, organised) (Huemer & Wang, 2021; Kull, Mena, & Korschun, 2016) framework, then it can presume to enjoy a sustained competitive edge.

In theory, the VRIO framework poses this question for valuable resources, “does the resources support the firm to exploit an external opportunity or nullify an external threat? In practical sense, does the resource consequently increase revenue, decrease cost or some combination of the two? Rarity means the control of resources or capability is in the hands of a relative few, or else perfect competition will set in. If a firm’s resources are valuable but not rare, there will be competitive parity, but if resources are valuable and rare, competitive advantage can be attained. Competitive edge of valuable and rare resources can be sustained only if competitors realise that it is too costly to imitate resources. Intangible resources are usually costlier to imitate than tangible resources (Bromiley & Rau, 2016; Chadwick & Flinchbaugh, 2021). Finally, firms’ structure and control mechanisms must be aligned to give people ability and incentive to exploit resources, that is, well-organised resources. All the aforesaid attributes coming together will assist the firm to have a competitive edge over its competitors. Despite the useful views posited by RBV, there are some weaknesses. One major setback is the fact that RBV focuses on the internal organisation of a firm and does not consider the external factors (Barney, 2014). It also has a limited ability to make predictions.

To gain competitive edge for startup businesses with the appropriate resources, there is the need to understand very well the startup system which is made up of elements and patterns adapting to its environment. Some of the elements in the system of startup are the entrepreneur, the production team, the sales team, IT section, finance and human resource team. All these members make up a complex adaptive system of a firm.

2.2. Complex Adaptive System (CAS)

CAS is seen as a system in which a knowledge of the distinct parts do not necessarily express a perfect understanding of the whole system’s behaviour (Liu, Tong, & Sinfield, 2021). The study of CAS merges understandings from both natural and social science to cultivate a controlled system (Obolensky, 2017).

CAS is complex, in that it is a dynamic and vibrant network of connections and its relationship is not a collection of individual static entities. Its adaptive properties stem from the fact that the singular and the collective behaviours metamorphose and self-organise (Escobar, 2017), thereby conforming to change-

initiating micro events or gathering of events. The study of CAS emphasizes complex, emergent and macroscopic properties of the system that have different components (often called agents) that interact and adapt or learn. Examples of CAS are: startups, firms, industries, markets, ecosystems and colonies. CAS has different components like patterns and agents which send feedback in the system. The agents intermingle and link among themselves in an unplanned and erratic way, which results in regularities forming a pattern which then gives feedback on the system and notifies the interactions of the agents (Liu et al., 2021).

A familiar feature to most studies of CAS is systems with numerous elements adapting and reacting to patterns these elements generate (Inigo & Albareda, 2016). This leads to patterns of self-organisation (Clayton & Radcliffe, 2018) and emergence. Interventions which are instant or later may end up in an irregular reaction from the adaptive agents in the system itself. In an event of a positive case, the agents self-organise to resolve the problem. In an undesirable scenario, the system reclines into chaos (Clayton & Radcliffe, 2018). If an attempt is made for intervention aiming at thorough control, the system may be down or paralysed. In summary, agents will adapt to the emerging pattern, the later or the environment has created, causing challenges for the intervener. One major characteristic of CAS is that hierarchy of command and control is not identified in the system, neither is there planning, but there is perpetual re-organising to discover the best fit with the surroundings (Gomes & Gubareva, 2021). CAS is all around us. Any start-up business belongs to a cluster of entrepreneurs locally and nationally and the economy as a whole. Therefore, it is part of many diverse systems, most of which are themselves part of other systems. The foregoing is literature on competitiveness to give a deeper view on competitive edge for the firm.

2.3. Competitiveness

The term “competitiveness” has a uniform definition in literature (Piatkowski, 2012). There is no one generalised definition of competitiveness, as it is constantly being developed. Nevertheless, as highlighted in “A Study on the Factors of Regional Competitiveness”, at the firm’s level, there exists a rationally clear and straightforward understanding of the concept of competitiveness based on the capacity of firms to compete, to grow, and to be profitable (Camagni, 2017). At this level, competitiveness resides in the ability of firms to steadily and profitably produce products that meet the requirements of an open market in terms of price, quality etc.

At the global or international level, competitiveness is the services or products provided by competing companies that serve international customers. Global competitiveness allows companies to buy and sell their services internationally (Fligstein & Calder, 2015), and this paves a way for increased profits and also levels the playing field in business. Worldwide, successful leaders recognise the need to familiarise with the ever-rapidly varying ways to do business in the glob-

al environs. These leaders seek to build competitive advantages around the core competencies of the organisation, while also reducing costs to conduct their businesses (Laszlo & Zhexembayeva, 2017).

Competitive Edge

Schilke (2014) identified competitive edge as something that separates the enterprise from others and keeps it thriving and growing (Maziriri, 2020; Schilke, 2014). Being innovative can lead to being competitive (Hong et al., 2019). The source of competitive advantage, which has been widely accepted since 1985, is Porter's Generic competitive strategies (Manteghi & Zohrabi, 2011). In this model, Porter discusses that there could only be two different ways for a firm to create competitive advantage (Porter, 2008). These are cost advantage and differentiation; between the two, an organisation can use focus strategy which can be a third alternative. By implementing a generic view, an organisation can establish operational effectiveness over its rivals and establish a difference that it can preserve, and this is the heart of competitive strategy (Kaya, 2015; Maziriri, 2020).

In Porter's generic competitive strategy, Porter (2008) argues that value creation starts with resources, distinctive competence and capabilities, coupled with cost or differentiation for the attainment of competitive advantage (Porter, 2008). A firm can only gain competitive advantage over its rivals by either performing at lower costs or by performing in a way that leads to differentiation, which creates greater customer value (Panwar, Nybakk, Hansen, & Pinkse, 2016). A firm's competitive advantage is explained by building retention rate than its competitors. However, the principal marketing blunder made by enterprises is their failure to utilise their competitive advantage.

At the global level, competitiveness of nations (Camagni, 2017) is realised by the ranking of countries, based on the Global Competitiveness Index, developed by Xavier Sala-i-Martin and Elsa V. Artad (Acs, 2010). The Global Competitiveness Report (GCR), which is a yearly report published by the World Economic Forum, ranks the world's countries according to the Global Competitiveness Index. It is made up of over 110 variables organised into twelve pillars, with each pillar representing an area considered as an important determinant of competitiveness.

Based on the above literature on competitiveness and competitive edge, startups would have to strategically look at certain critical factors to have a competitive edge. This can be done by exploring future opportunities and better resources and marshalling well-experienced teams to work with them.

2.4. Critical Factors for Startups

2.4.1. Competitive Edge and Entrepreneurial Opportunities

In today's world of globalisation, it has become increasingly challenging for enterprises to maintain their competitive advantages (Fligstein & Calder, 2015). To sustain competitive advantage, entrepreneurs have to grab opportunities (Bao, Wei, & Di Benedetto, 2020; Hassan, Yaacob, & Abdullatiff, 2014) from both do-

mestic and global environments because customers have the option to choose not only from local production, but from the worldwide production. Firms are, therefore, forced to produce quality goods by adapting to lifestyle changes and by being flexible.

Based on fierce competition, businesses are required to have accurate strategies (Chang, 2014) in order to have greater opportunities and competitive advantage. The interconnectivity of business strategy and competitive advantage of a company demonstrates accurate strength and opportunity of that company (Brooks, Heffner, & Henderson, 2014). The uniqueness of strategy exhibited by a company and the specific processes of its implementation are the bedrock of maintaining and enhancing competitive advantage (Fligstein & Calder, 2015).

The success of organisations centers remarkably on their ability to sustain competitive advantage and achieve superior firm performance. This can be done through the rareness or distinctiveness of products (Kim & Atuahene-Gima, 2010) that are not possessed by competitors. If other competitors would imitate, they would have difficulty or pay a large cost. A successful entrepreneur sees an opportunity, combines it with the needed resources and works with efficient team members for greater performance, as depicted by Timmons Model of Entrepreneurial process.

In his model, Timmons (1985) identifies three variables, namely: opportunity, resources and teams (Florin, Karri, & Rossiter, 2007; Kazanjian, Drazin, & Glynn, 2017; Timmons, 1985). Timmons indicates that the entrepreneur identifies an opportunity and shapes it to become a startup venture. The entrepreneur then gathers the resources that are necessary to start the business to exploit the opportunity. An entrepreneurial team is a key element for success because it ensures that the necessary skills are in place to increase the likelihood of startup success. The entrepreneurial process begins with more than an idea; it involves an opportunity and resources for successful performance.

China's investment opportunities, for instance, are expanding. The Chinese economy is deeply integrated with the global economy (Ghisellini, Cialani, & Ulgiati, 2016) and forms an important driving force globally. Investment opportunities in infrastructure connectivity as well as in new technologies (Shao, Ma, Sheu, & Gao, 2017), new products, new business patterns and new business models are constantly springing up. Additionally, China is using the Belt and Road Initiative (BRI) (Huang, 2016) to address excess capacity in its industrial sectors, in the hope that production facilities may eventually be migrated out of China into BRI countries (Shao et al., 2017).

Innovation opportunities and increase in startups emerging in nations worldwide and the upgraded innovation capabilities (Govindarajan & Ramamurti, 2011) of China and India, in particular, has led to a close competition with the western nations like USA, Japan (not western) and Germany. Similar to China's economic reform, transitioning from "made in China" to "innovated in China" can be a tough national journey with abundant opportunities and challenges un-

folding along the way. However, entrepreneurial failure reduces uncertainty that lead to the unearthing of new opportunities (Bao et al., 2020; Brooks et al., 2014). Consequently, not only successful experiences can increase the usefulness of opportunity recognition, but, also, failure intensifies the effectiveness of opportunity recognition.

2.4.2. Competitive Edge and Entrepreneurial Resources

Local and international firms develop justifiable competitive advantage by leveraging the resources that they possess (Dana, Gurau, Light, & Muhammad, 2020). These resources are described as unique, rare, non-substitutable and difficult to imitate by rival firms, these include assets and capabilities (Kaleka, 2002). However, in the context of small business, especially within startups, previous literature has emphasized the key role of managerial resources (Al-Aali & Teece, 2014).

The RBV emphasizes that firms' resources are vital aspects that affect competitive advantage and performance (Chaston, 2015). RBV defines resources as physical assets, intangible assets and organisational capabilities that the firm owns and controls (Kellermanns, Walter, Crook, Kemmerer, & Narayanan, 2016).

According to Barney (2014), resources can be classified into human capital resources, physical capital resources and organisational capital resources (Barney, 2000, 2014). Human capital resources constitute an energetic resource for every economy (Popescu, Comanescu, & Sabie, 2016). Excellent intellect of human resource is also a vital element for competitive advantage.

According to RBV, firms control certain resources under various categories that can possibly contribute towards enhanced performance (Chaston, 2015). Previous studies verify that firms possess resources that provide the probable competitive advantage which subsequently lead to greater performance (Bromiley & Rau, 2016). In a similar vein, Barney (2014) indicates that competitive advantage could be obtained with suitable management of companies' resources, like finances, personnel, technologies, materials and others and proper harmonisation of companies' functions like marketing, manufacturing, distribution and others (Barney, 2014). Financial or physical resources are tangible and employees' knowledge, experiences and skills and firms' reputation are intangible, and these are mobilised to create a sustainable competitive advantage. Pearson et al. (2015) also assert that companies acquire competitive advantage through resources which are tangible and intangible (Pearson et al., 2015).

Additionally, organisational capital resources are the buildup and use of private information to enhance production competence within a firm (Gunasekaran et al., 2017). The components of organisational capital are the firms' culture, structure and organisational learning which, when harnessed well, can be a source of a firm's value and constitute a great competitive advantage.

2.4.3. Competitive Edge and Entrepreneurial Experience

In their quest to have competitive advantage over others, entrepreneurs need a

lot of experience in entrepreneurial activities (Winkler, Fust, & Jenert, 2021). Research efforts should be redirected toward the study of habitual and typical entrepreneurs (Spivack, McKelvie, & Haynie, 2014). Routine entrepreneurs have had many opportunities to attempt businesses, to scrutinise the attempt and, after several attempts, to recognise their errors and to correct them in ensuing ventures. Entrepreneurs build an experience curve for managing enterprises for years. Differentiating between experienced and inexperienced entrepreneurs should not only distinguish between beginner and experienced entrepreneurs, but also make a distinction on the basis of their characteristics, and, more importantly, on their performance.

Organisations' achievements depend on employees' knowledge, experience, creative activity (Ibidunni, Ogunnaike, & Abiodun, 2017) and qualification; emphasis is placed on continuous learning and research and development. Most experienced entrepreneurs are creative, knowledgeable, skilled and possess diverse abilities which can generate innovative ideas that assist their respective firms to achieve competitive advantage over others.

The experienced entrepreneurs' personal attributes are essential to the management their enterprises. Such personal qualities include: integrity, aggressiveness, confidence, dignity, decisiveness, resolution, toughness, flexibility and quick thinking. Recent changes in economies have resulted in the movement of knowledge-based activities to creativity, innovation, entrepreneurship and imagination (Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008). Most experienced entrepreneurs have been creative over the years and that has given them their competitive edge. One way of understanding creativity is to think of its particular attributes within a process (Serrat, 2017), product, place or person, as a form of expertise or as an ability.

Creativity is the ability to make new things or be innovative (Ibidunni et al., 2017), as the actualising of potential involving the integration of logical side with the intuitive side. It is also regarded as a central element in problem solving, and there are a number of methods in which creative thinking can expedite decision making. Entrepreneurs who are creative are empowered to act on opportunities in ways which can result in competitive advantage for their organisations. Creativity can also provide the basis for innovation and business growth, as well as impacting positively on society generally.

2.4.4. Startup Model Using Vensim Software

The System Dynamics Model with the use of Vensim software was used to depict the various variables used in the study. System dynamics models are computational simulations that model a given target or referent system as a set of state variables (stocks) and their associated rates of change (flows), based on the method (Maital, 2016). This is because it is an interactive software that allows exploration and analysis of simulation models. It also has the ability to represent a complex system and analyse its dynamic behaviour.

The results (Figure 1) from system dynamics depict that Resources, Experience and Opportunity have a relationship with competitive edge when someone wants to start a business. The capability of the entrepreneur to have opportunities, resources and experience will enable him/her have a competitive advantage over his/her competitors to start a self-organised innovative business. The results above presupposed that an entrepreneur with a vision, mission and well-planned strategies is skillful and has innovative abilities. The innovativeness of the entrepreneur will result in exhibiting differentiation and cost leadership strategies, leading to competitive edge. The results from the system dynamics led to the framing of the model in Figure 2 which has entrepreneurial opportunity, resources and experience as independent variables having the ability to influence self-organised startup businesses. The mediating variable, which is competitive

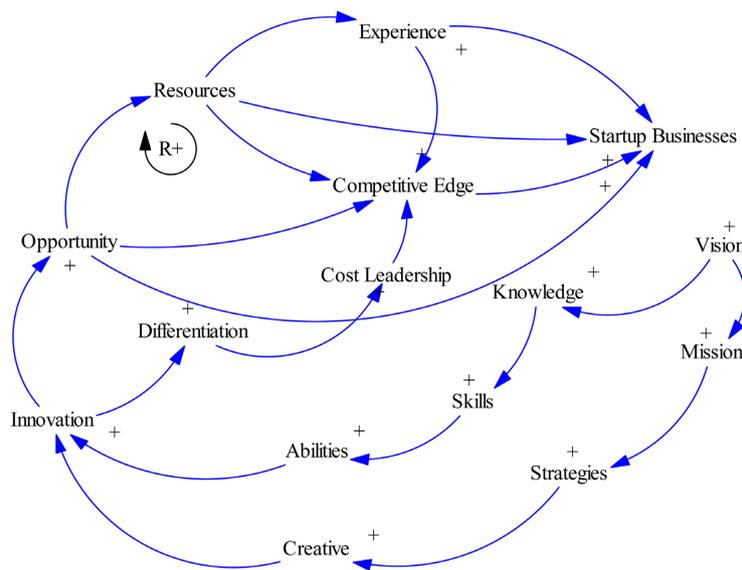


Figure 1. Use of Vensim software for summary of key variables. Source: Author’s framework.

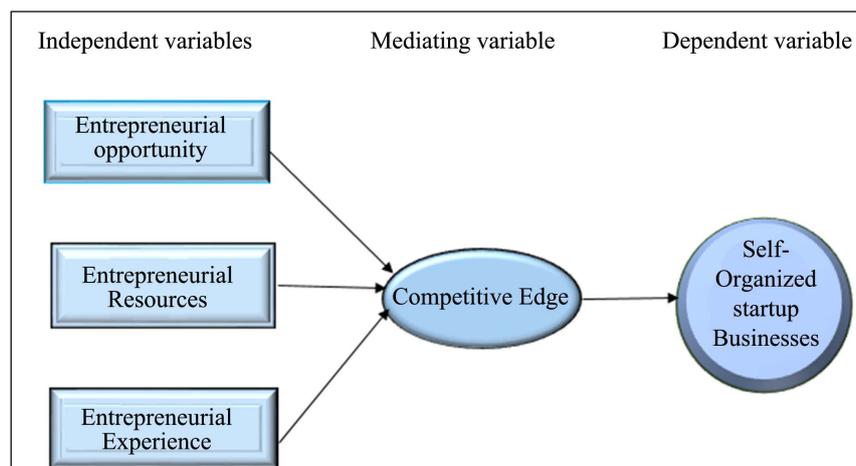


Figure 2. Mediating role of competitive edge. Source: Author’s framework.

edge, has effect on the independent variables which, in the long run, result in the dependent variable.

To summarize the literature above, extended review was done on the theories underpinning this study; which are Resource Based Theory and Complex Adaptive system. Literature was also reviewed on competitiveness. Competitive edge, entrepreneurial opportunities, resources and experience.

The gap established in extant literature was filled by establishing the following novelties.

The use of a broad-based perspective of the study's focus and approach by using and combining three different trigger factors: entrepreneurial opportunities, resources and experience to impact on self-organized startup businesses making the study innovative as it has not been done in the extant literature.

The ability to ascertain the significance of complex adaptive system on self-organized startup business in this study has the potential to create a new paradigm shift of a rethinking and reshaping of the strategic orientation of firms in the pursuit of self-organized businesses make the study innovative.

The researcher's analysis of competitive edge interactivity of the trigger factors impacts on self-organized startup businesses has never been tested in the literature.

2.4.5. Conceptual Framework

The conceptual framework above depicts three elements: 1) the independent variables, 2) the mediating variable and 3) the dependent variable. The independent variables are the factors that trigger startup businesses which are opportunities, resources and experience. The confounding variable, which is competitive edge, is mediating between the trigger factors and the dependent variable which is the expected end result or endogenous variable.

Grounded on the theoretical and conceptual framework, to investigate how competitive edge is gained with the understanding of complexity theory for self-organised startup businesses, the following Hypotheses were developed:

H₁: There is a positive and significant relationship between entrepreneurial opportunities and competitive edge.

H₂: There is a positive and significant relationship between entrepreneurial resources and competitive edge.

H₃: There is a positive and significant relationship between entrepreneurial experience and competitive edge.

H₄: There is a positive and significant relationship between competitive edge and startup business.

3. Methodology

The study aimed at investigating how self-organised startups can differentiate themselves by understanding complex systems for a competitive edge and successful performance. The research design was quantitative research with a set of

questionnaires for data collection. As a social science study, the quantitative design which is a methodical empirical investigation of evident phenomena through the use of statistical, mathematical or computational techniques was deemed appropriate.

Detection and surveying of different solutions were performed by combining secondary and primary sources of information. More specifically, data on competitiveness for self-organised startups were collected from potential entrepreneurs from Zhenjiang city in the Jiangsu Province. A questionnaire was developed based on entrepreneurship.

The study uses structural equation modeling (SEM) for the testing of its hypotheses. The use of SEM was deemed appropriate because it uses diverse sets of mathematical models, and statistical methods that fit the constructs to data. These include: confirmatory factor analysis, path analysis, and latent growth modelling. SEM was also used to assess unobservable “latent” variables using one or more observed variables and a structured model that imputes relationships between latent variables. For example, the concept of opportunities, resources and experience cannot be measured directly, so hypotheses were developed and measurement instrument with questions were designed to measure the different constructs, according to their hypothesis. These hypotheses were then tested using SEM via data gathered from respondents.

Under SEM factor loadings are usually affected by the number of indicators in the model that constitute various constructs. The factor loading of an indicator to its underlying factor is dependent rather than fixed. The value of the factor loading of a specific indicator may change if more indicators are added to the model. For newly developed items, the factor loading for every item should exceed 0.5 (Hoque & Awang, 2016).

The questionnaire is divided into five main sections. Section one consists respondents’ demographics (age and gender) and the intention to set up a business. Sections two dealt with entrepreneurial opportunities. The third section centered on entrepreneurial resource while the fourth dealt with entrepreneurial experience. The last part elicited data on competitive edge and startups.

The conceptual framework sought to establish whether or not the dependent variable (Startup Business [SB]) is influenced by the independent variables which include: Entrepreneurial Opportunity (EO), Entrepreneurial Resources (ER) and Entrepreneur Experience (EE). Also, the conceptual framework sought to establish whether or not the mediating variable (Competitive Edge [CE]) is influenced by the dependent variable SB.

3.1. Sampling Analysis

The questionnaires that were sent to the field, based on cluster sampling and random sampling, totaled 400 copies. Cluster here means focusing on Zhenjiang city. The responded questionnaires received were 350 copies which constitute 87.5% collection rate. That indicated that more than half of the questionnaires

were retrieved. Based on Cochran formula for sampling size calculation, 87.5% is a representation of the population. Other questionnaires were not received due to reasons like missing questionnaire, respondents' unavailability and relocation of respondents.

The study results indicated that 212 of the respondents were male representing 60.6 percent whilst 39.4 percent were female. In terms of gender perspective of entrepreneurship, this adds to previous research findings which indicate that more men engage in businesses than women (Georgellis & Wall, 2005; Maes, Leroy, & Sels, 2014). Also, the study revealed that 37.1 percent being the highest were respondent aged from 24 to 28 years. The second highest respondents of 84 representing 24.9 percent were within the ages of 19 to 23 years whilst 15 of the respondents representing 4.3 percent were more than 50 years old and represented the lowest age group in the study.

The study used a Likert-type five-point scale adopted from Keat, Selvarajah and Meryer (Olugbola, 2017) ranging from 1 ("strongly disagree") to 5 ("strongly agree") for all the constructs measuring self-organised startup businesses. EO, which is one of the constructs was measured by five (5) indicators, for instance: "I am ready to set up a business with any least opportunity", and "I have a lot of ICT knowledge for current technology". The second construct which is ER, was measured by 5 indicators among which included: "I have enough training and skills as human capital resource" and "I have a lot of knowledge and experience about entrepreneurship and my parents will assist me with physical capital resources". The third construct which is EE and which had 5 indicators was measured with: "I always benefit from partnering with experienced entrepreneurs for advice", "I have a lot of experience from getting close to my entrepreneur friends" and "I have been assisting my parents who have been entrepreneurs since my childhood". Another construct which is SB and had 5 indicators was gauged with: "I have the passion to create jobs for people" and "I am ready to set up a business with any least opportunity". CE, which was the last construct and the mediating variable was measured using 5 indicators, with examples such as: "I have the ability to compete and be profitable in any business venture" and "I have the knowledge of reducing costs while conducting business".

3.2. Reliability and Validity Check

One area which is quite vital in social science research is the quantification of human behaviour, that is, using measurement instruments to observe human behaviour. The measurement of human behaviour is widely acknowledged by the positivist view or empirical analytic approach, to discern reality. Reliability is an important concern when a psychological test is used to measure behaviour (Bell, Bryman, & Harley, 2018; Thompson & Thompson, 2003). The most commonly used procedure to estimate reliability is with a measure of association, the correlation coefficient, often termed reliability coefficient (Drost, 2011).

The reliability coefficient is the correlation between two or more variables

(here tests, items, or raters) which measure the same thing. Details of the reliability test are represented in **Table 1**.

The Cronbach's alpha indicated up to .855 demonstrating a strong consistency.

3.3. Findings and Data Analysis

The study used structural equation modelling to establish relationships between the independent, mediating and dependent construct. The data was analysed using AMOS 22.0 software package. To adhere to modifications made in the indicators, the study through Amos 22.0 conducted confirmatory factor analysis.

To guarantee that the data is representative of its anticipated purpose, reliability, validity and factor loadings for the constructs were assessed. The Cronbach's alpha for the constructs ranged from 0.731 to 0.855, which are well above the 0.70 indicating a good internal reliability of the constructs' indicators. The validity of the data was tested and the data was considered valid, as all the values of AVE met the 0.5 threshold.

The analysis shows that all the measurement models and constructs used, fit the data. Thus, Absolute fit index, Incremental fit index and Parsimonious fit index were all within the acceptable ranges (RMSEA = 0.037, CFI = 0.968, GFI = 0.932). These are shown in **Table 2**. This means that the data is a true measure of the model.

Table 1. Reliability test.

Variables	Cronbach's Alpha	No. of Items
Entrepreneurial Opportunity	0.855	5
Entrepreneurial Resources	0.731	5
Entrepreneurial Experience	0.740	5
Startup Business	0.839	5
Competitive Edge	0.799	5

Source: survey data 2018.

Table 2. Fitness indexes.

Name of category	Name of index
Absolute fit	RMSEA = 0.037
	GFI = 0.932
Incremental fit	AGFI = 0.914
	CFI = 0.968
	TLI = 0.963
	NFI = 0.908
Parsimonious fit	Chisq/df = 2.52

3.4. Testing of Hypothesis and Results

The results of the test on the hypothesis confirmed and supported hypothesis H_1 ($\beta = 0.138, p > 0.001$) showing a positive and significant level, hypothesis H_2 ($\beta = 0.205, p < 0.001$) also positive statistically and showing a positive and significant level, hypothesis H_3 equally indicating ($\beta = 0.399, p < 0.001$) positive relationship and hypothesis H_4 ($\beta = 0.037, p < 0.001$) also statistically significant.

From the results, we accept the alternate hypothesis that there is a relationship between competitive edge and business startups. We also accept the alternate hypothesis that there is a relationship between entrepreneurial opportunity and competitive edge, entrepreneurial resources and competitive edge, and entrepreneurial experience and competitive edge.

Explanation for the Influencing Coefficients for the Variables in the Model

$$SB = \alpha + \beta_1 EO + \beta_2 ER + \beta_3 EE + CE\mu \tag{1}$$

$$SB = \alpha + 0.138EO + 0.205ER + 0.399EE + 0.037CE \tag{2}$$

From Equation (2) above, if there is a unit increase in EO (β_1). It will lead to 0.138 increase in SB at a p -value of 0.001 which is statistically significant. Also from the equation, a unit change in ER (β_2) will bring about 0.205 increase in startup businesses (SB) at a p -value of 0.001 which is also significant. Furthermore, a unit change in CE will lead to 0.037 change in SB. Lastly, if there is a unit change in EE (β_3), it will influence SB by 0.399 which was constrained.

3.5. Results from AMOS (Figure 3)

Confirmatory factor analysis was done to find out which of the indicators measure the constructs well. Some of the indicators failed to measure well, so indicators with modification indices above 15 were removed to correct the model fitness resulting in the fitness indexes below.

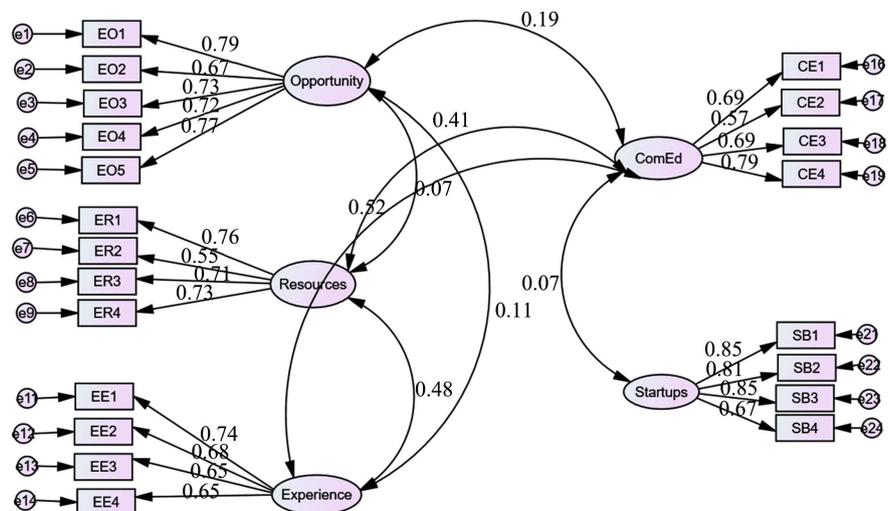


Figure 3. Confirmatory factor analysis.

4. Discussions and Conclusions

In evaluating how competitive edge can be gained by self-organised startup businesses, the study conducted a test to determine the relationship between the critical factors which are entrepreneurial opportunity, entrepreneurial resources and entrepreneurial experience with competitive edge. This research has also established that there exist relationships between self-organised startup businesses and competitive edge. Additionally, there exist relationships among the three constructs (opportunity, resources and experience). The findings are indicative of the three constructs having the ability to influence competitive edge and also competitive edge influence on startups.

Evidently, EO has a positive and significant effect on CE ($\beta = 0.138$, $p > 0.001$). ER has significant relationship with CE ($\beta = 0.205$, $p < 0.001$). EE was also significantly related to CE ($\beta = 0.399$, $p < 0.001$) and CE was statistically positive to SB ($\beta = 0.037$, $p < 0.001$).

As discussed, getting the right resources and using them well put a firm in a competitive advantage circle. Startups should view their competencies, tangible and intangible resources as a means of gaining competitive edge. Firms that want to gain competitive edge should have valuable resources which are rare, should have resources which are costly to imitate and should be an organised firm to be highly competitive. The Vensim model and structural equation models depict that the critical factors (opportunities, resources and experience) tested are in a “system” called startup business. This system needs to be understood well to gain competitive edge with a background knowledge of CAS which involves relationship, patterns and repetition in the startup system. It is laudable for entrepreneurs to comprehend that startups are systems that need to be managed in order to shape the individual elements in the system and their collective behaviour to metamorphose and self-organise. Functions and characteristics of the system must be based on the overall understanding of the system and to achieve optimisation. System and environment influence each other.

Startups should first choose an environment and adapt to it. The system must carry out exchange with the environment, that is, continual adjustment, adapt to the environment, self-adaptation and self-regulation. The changing of the system's structure, statute, characteristics, behaviour and function with the passage of time signify the evolution of the system. Some of the individual elements in the startup system are the production team, sales assistants, finance, information technology section and advertising department. These individual divisions must come together symbiotically to constitute a strong force and team to deliver products or service(s) with some differentiation in order to gain competitive edge and outperform competitors. Entrepreneurs should be responsible for identifying problems. They must pay attention to crises or opportunities that influence the survival and development of the startup system. By doing these, the entrepreneurs become unique and different, consequently having competitive advantage over others. The study affirms the findings of [Barney \(2014\)](#) which

confirms that by exhibiting differentiation, a firm can establish operational effectiveness over its rivals which is the heart of competitive strategy. It also contributes to existing discussion on startups and competitive edge with the resource base view competitiveness and startups (Lin & Wu, 2014).

Entrepreneurs who start their own businesses should view their competencies and resources as a means of gaining competitive edge. As the findings suggest, this research has also established that there exist relationships between self-organised startup businesses and competitive edge; also the three constructs (opportunity, resources and experience) have the ability to influence competitive edge and competitive edge influence on startup businesses.

The findings of the study imply that more people will be encouraged to start their own businesses and exhibit products and services which are valuable, rare, not easily imitable and well organised in society in an effort to be competitive and to boost the economy.

Also, through this study, the government and policy makers will formulate relevant policies, strategies and guidelines to boost start-up businesses. This will encourage activities, projects, programmes and policies that will improve the capacities and abilities of young entrepreneurs to identify entrepreneurial opportunities in their environments. In addition, the study will inspire academic institutions to inculcate entrepreneurship in the academic curricula to educate young graduates to start their own businesses instead of waiting for the government to employ them. This will go a long way to affect the quality of life of the youth and lessen unemployment in society.

5. Contribution and Implications

This study will make substantial contributions theoretically, practically and methodologically to the empirical studies of self-organised start-up businesses in order to enrich related understanding and comprehension of competitive edge on self-organised start up system. The findings will, additionally, provide insights that will help in the enactment of policies for guidelines to boost start-up businesses.

By adopting the system dynamics with the use of Vensim software and structural equation modelling with Amos software package 22.0 in the analysis of the data and establishing statistical relationships, the study has supplemented the methodology adopted in self-organised startup businesses research from the many usual regression analysis approaches.

More so, this study contributes theoretically to the body of knowledge in many ways. Firstly, this research is the first of its kind to use different trigger factors (opportunity, resources and experience) that can influence self-organised startup businesses to differentiate themselves to achieve competitive edge and successful performances.

Based on the empirical results, this study reveals that, China has been creating an entrepreneurial economy in the transition from a central-planning system to

a market-based economy (Zhang, 2013). In a study conducted by Du and Yang (2014), it was found that China after several years of market transition has made tremendous development in entrepreneurial organisations both in private and state-owned enterprises (Du & Yang, 2014). Entrepreneurs have been empowered with knowledge, skills and resources that contribute greatly to the development of the entrepreneurial sector, which, consequently, promote self-organised startup productivity growth.

Secondly, this research has a theoretical contribution to the entrepreneurial sector, self-organised startup business sector and entrepreneurship development. The study developed a theoretical framework drawing knowledge from RBV, managerial economics and sociology. Furthermore, CAS was also discussed to highlight the fact that self-organised startup is seen as a system in which a knowledge of the distinct parts does not necessarily express a perfect understanding of the whole system's behaviour. The different parts of the system intermingle and link in an unplanned and erratic way, which results in regularities forming a pattern which gives feedback on the system and notifies the interactions of the agents (Akgün, Keskin, Byrne, & Ilhan, 2014).

Any startup business belongs to a cluster of entrepreneurs, locally and nationally and the economy as a whole, so it is part of many diverse systems, most of which are themselves part of other systems.

The study also has policy implications. The role for policy is to identify a small pool of potential startup innovators and provide special support to this group to help overcome the particular constraints they encounter, for example, in terms of management skills development, growth, finance, finding partners in external markets, linking into an innovation support infrastructure and accessing appropriate premises.

The study has a strong potential to develop innovative entrepreneurship to entrepreneurs and the economy as a whole. Regulators, through this study, will streamline policies relating to entrepreneurship for an improved economy. Also, self-organised innovative startups facilitate specialisation, high profitability, economies of scale, human and financial synergetic environment and above all high innovative performance.

The study recommends that regulators and policy makers enact relevant policies, strategies and guiding principles to help boost start-up businesses and encourage events, projects and programmes that will improve the capacities and abilities of young entrepreneurs to identify entrepreneurial opportunities in their immediate environments as well as being inventive in their ideas related to startup businesses. That is, there ought to be thoughtful policies and agenda to ensure that the financial environment is encouraging to attract people to commence their own businesses.

5.1. Emerging Trends

Self-organised startup is a fast-evolving transformational development of the

21st century which is capable of restructuring economies internationally. As the main drivers of economic growth, entrepreneurs are the bedrock of any growing economy, because they create jobs, introduce new products and services and stimulate greater upstream and downstream value-chain undertakings and accomplishments.

The Organisation for Economic Cooperation and Development has iterated that, SMEs, on the average, contribute around 50% or more to the GDP, provide employment to an estimated 60% of local workforce, create up to 70% of new job opportunities and account for about 30% of exports. In recent years, the global entrepreneurial setting has observed a crucial pattern in terms of trends, with SMEs playing an ultimate role in social and economic advancement.

5.2. Limitation and Further Research Directions

There are some limitations that exist in this study. Firstly, the study was conducted in a cross-sectional base; therefore, it could not capture the trend in the actions of these entrepreneurs in terms of their competitive edge. In the future, researchers can expand their focus by conducting longitudinal studies in this area to analyze how competitive edge influences self-organised startups over time. Another limitation of the study is that the researchers did not pay attention to the competitive edge of the entrepreneurs in relation to specific organising activities. In this regard, studies that seek to examine how competitive edge influences specific organising activities of these entrepreneurs in the future will further enhance the understanding of self-organising entrepreneur startups. Again, different industries have different views on self-organised and competitive edge and their findings may not be generalised to other contexts, but it is also important experience or references for other related researchers. The exploratory nature of the case in the context of a single country offers important insight in terms of gaining understanding of the effect of competitive edge on self-organised startups context.

The contribution of the study is worth of our sample size which comprises China-based entrepreneurs, where self-organised entrepreneurship has already created business legends, most of whom are using complexity theory to understand better how self-organised startups work. There can also be studies on the effect of competitive edge on startups from other countries in future studies, like One Belt and One Road initiative (from China) to broaden the scope of competitive edge. Another contribution of this paper is that, it has opened up a discussion on how competitive edge is very important at the individual level of the entrepreneurship literature, establishing how competitive edge influences self-organised startup businesses. The findings will help entrepreneurs and those who intend to establish businesses to build their skills and capacities to have competitive edge since that is crucial to the survival of their businesses in the world of globalisation.

Further research can be done on the impact of self-organised startup on mass

entrepreneurship, intellectual manufacturing and policies and evolution mechanism. From academic studies, self-organised startups should be further researched from self-organised theories, for example, dissipative structure, catastrophe and synergetic theories.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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