A conceptual framework for measuring entrepreneurship and innovation of young hi-technology firms

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***Abstract*— This paper examines the different theories that have been developed in economics and innovation management to explain the causal chain of events through which entrepreneurs can deliver more innovation and ultimately higher growth for the benefits of the regional and national economies and identifies the key firm-based factors that lead to survival and long term development of high technology firms. It determines the extent of the entrepreneurial activities and possible factors that constrain or assist the growth process of these firms. It then draws upon the key predictions of the core theories of entrepreneurship and innovation to formulate a model for measuring the characteristics of entrepreneurial hi-tech firms, characteristics of innovating firms, and innovation and firm growth dynamics. The model is developed to explain these key building blocks that might lead to enhanced prior economic growth and the patterns and dynamics observed in a developing country context.**

Keywords- entrepreneurship; innovation; hi-technology firm

I. Introduction

During the past centuries, entrepreneurship and innovation have been viewed by scholars as the critical sources of organizational survival and growth in the national economic evolution. Entrepreneurial activities and technological innovation have been widely recognized as crucial factors for national economic development in Western economies. The theorist Joseph Schumpeter [1] was praised as the "prophet of innovation" [2] since his theory of Economic development has been published. This theory was considered as the first step in the origination of theoretical instruments and concepts which examined the real economic world. The Schumpeterian system of economic thought also assigned crucial role to entrepreneurship together with its indivisible and rooted innovative nature [3] by highlighting economic development as the core of innovation and the major role of entrepreneur as an innovator [4].

Meanwhile, economist such as Swedberge reaffirmed the influence of Schumpeter's entrepreneurship studies. He says "…of all the theories of entrepreneurship that exist, his theory is still, to my mind, the most fascinating as well as the most promising theory of entrepreneurship that we have" [5, p.2]. Entrepreneurship has become the crucial driver on economic growth in both low and high income countries [6] which is currently happening at higher rate than at any time during the last century [7]. Typically, in the developing country the innovation context plays an important role [8] in the introduction of new products and services to the market by businesses [9]. While, innovation at all segments and organization levels is imperative for organizations [10] as it involves a complex process with multiplex links between new technology and science as well as capability producers and buyers [11] and, as a result, the businesses can build up the technological capabilities that will allow them to innovate better than other firms [12]. Veeraraghavan [13] concluded that a combination of the Innovation and entrepreneurship factors would lead to successful businesses.

Earlier studies indicated that entrepreneurship and innovation are crucial issues in the development process of firms which want to use them as vehicles to drive economic growth. They are also consider as the fundamentals of technology creation and mobilization for use by the entrepreneurs in both the developed and developing economies to get through to the technology in the world, especially for new firms which are more likely to innovate [14] and to nudge the regional growth [15] due to the entrepreneur's capabilities to exploit

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technological innovation to bring forth long running economic performance [16].

In the past two decades, high-technology based firms had been crucial in the modern economies [17]. Whilst, the rationale of the research by Almus and Nerlinger [18] highlight that small and medium size of new high-tech enterprises is proliferating. Interestingly, there have been a number of exploratory studies in the area that have addressed the measurement an achievement of young hi-tech firms, but not in the developing country study is known to the authors which systematically surveys the population of new enterprises in hi-technology sectors and the important of the phenomenon on the development of new hi-tech start-up still lower recognize. Moreover the substantial theoretical model explaining the growth of young firms and new hi-tech firms does not have width and breadth enough [19, 20]. In addition, very little work on factors which lead to the survival and growth of small innovative firms and firms' performance, especially on the impact of managerial decisions and research resource [17] has been done despite that small firms can make a positive contribution to economies by increasing productivity, creating new markets, and expanding employment opportunities [21]. Finally, it has been found that there is an overlapping between the quantitative research and case study surveys, especially the empirical subject of case studies nowadays have minority been generated testing by researchers. Also the studies published currently have not applied all relevant theories of young hi-tech entrepreneurship.

From the above comprehensive literature has identified a number of gaps in an existing circumstances and research papers, and it is evident that hi-tech firms have not previously been deeply researched on the development of young hi-technology entrepreneurship. Therefore, to fill the earlier research gaps, the core theories of entrepreneurship, innovation and firm growth have been used in this paper to create a conceptual model for measuring the three main areas, namely the characteristics of Entrepreneurial Hi-tech firms, the characteristics of Innovating firms, and innovation and Firm Growth Dynamics which can be used to explain the casual chain of events from which entrepreneurs can deliver more innovation and ultimately higher growth for the benefit of the regional and national economies.

The research not only adds to existing generic knowledge for high technology entrepreneurs, but also more recently fills a specific gap in the current understanding and literature on hi-technology entrepreneurship studies in both the theory of entrepreneurship and innovations as these theories have been developed to explain in Western countries.

II. THE DETERMINANT OF ENTRENERUSHIP AND INNOVATION OF HI-TECHNOLOY FIRMS

A. Entrepreneurship

Entrepreneur can be found in every country, it is not unique to any gender, ethnicity, age or economic sector [22]. Entrepreneurs defined as "person who is ingenious and creative in finding ways that add to their own wealth, power, and prestige" [23, p.987]. The function of entrepreneur is " to reform or revolutionize the pattern of production by exploiting an invention or, more generally, an untried technological method of producing a new commodity or producing an old one in new way, opening a new source of supply of materials or a new outlet for products, by organizing a new industry" [1, p.117].

The topic of entrepreneurship is complex and has broad level of meaning context [24-25] and not well-developed component of the modern economic theory [26], so it is difficult to reach a consensus on a proper definition [27]. There is no universally accepted entrepreneurship definition [28-30], so the theorists tended to separately the theory of entrepreneurship [31].

For examples, Kuratko and Hodgetts [32] defined the entrepreneurship as a concept of an individual innovative style of business, which basically refers to a person who has initiated innovation skill and is searching for the higher achievement [33]. While an Austrian economist Joseph Schumpeter who has been designated as the key figure in the literature of entrepreneurship [34] claimed that entrepreneurship is the main issue in the theory and practice of economic growth and development [35]. He explained that entrepreneurship is in the center of the development process for entrepreneur in the modern world to form a 'creative destruction' for creating and exploiting the opportunity for technological production to expand new product, new market and new resources, even though these activities face risk and uncertainties. Thus, entrepreneurship is considered as the important factor to enhance the need of business investment in economy [1]. As such, the general definition of entrepreneurship is the study of the individual discovery and exploitation of entrepreneurial opportunities [36] to create new products, new processes, new resources, new markets, and/or

same product in new market under risk and uncertainty circumstance.

Based on the vast consensus among scholars and theorists, entrepreneurship is an important vehicle for economic growth in both the developed and developing economies [25, 37-39] which plays an important role in wealth and job creation. This belief was the basis of the work of a number of researchers from different economic backgrounds for many decades [40]. In addition it is also considered as an outcome of the balancing of opportunity, risk and reward [41], thus, entrepreneurship is the crucial driver to business success [42-43] and generation of economic development [44].

B. Innovation

The innovation is basically found in developed economies and has been conceptualized in different ways. Fagerberg, Mowery, and Nelson [45] highlighted that the worldwide center of innovation is generally shifted from one sector, region and country to another, for an example the data gathering from the survey of UK , it has been found that the rising of productivity and income of population correlated to the neighbor countries.

Nevertheless, the concept of innovation is broad, as it contains a complex process which combines new science and technology and potential manufacturers and customers [46]. Hagedoorn, [47] who reviewed the work of Schumpeter, said that the definition of innovation that was given by Schumpeter referred to the 'new combinations' associated with technical, marketing and organizational aspects. It is rather too broad in scope to understand the complexity of technological development. This is why the term innovation as defined by Schumpeter has been criticized by many scholars.

Meanwhile, other researchers have defined the innovation framework as the exploitation factor of new market, new business formation and new sources [48-51]. This explanation is very similar to the definition of Szirmai, Naudé, and Goedhuys [4] which states that innovation is involved in the exploitation of new market, new organization and new sources, however, they also pointed out that the development of new products and new processes should also be addressed. Whereas Van Praag and Versloot [25] argued that the innovation approach is associated with the firm's innovative outcome in both quality and quantity of production and has always given impetus by new market and technological opportunities [52].

It is cleared the innovation subject is very important because innovation is a mechanism driving the business survival and success.

C. The Important of Entrepreneurship and Innovation

Referring to the earlier definitions of entrepreneurship and innovation, it has been found that basically entrepreneurship and innovation are debated in the field of economic, business management and others and that they are correlated. The entrepreneur can only be understood if it is placed in the background of innovation theory [51]. To support the argument of the earlier study, Alam and Hossan [52] found that entrepreneurship is a process that people pursue their opportunities and need fulfillment throughout innovations as it is a key-based factor in driving the development especially in small business [53] and pushing the success for business [54-55]. The link between entrepreneurship and innovation is important because not only it acts as a pillar, but also as the enhancement for high potential benefits in developing countries as well [56].

In addition, there is an interesting examination of the correlation between entrepreneurship and innovation by Veeraraghavan. She argued that innovation and entrepreneurship are a two-way relationship as the innovator creates and gives the idea to entrepreneur to introduce that idea into the market system. Then entrepreneurship helps to generate new idea for economy, create culture of independence, risk taking and confidence. As a result, the combination of the factors of innovation and entrepreneurship leads to businesses achievement [13].

D. New Business Formation

Now we turn our attention from the important correlation between entrepreneurship and innovation to the formation of new firms by studying the impact on economic growth. The empirical data reported by The Global Entrepreneurship Monitor (GEM) studying the broad business start-up across 60 countries both in developed and developing countries since 1999 and focusing on key driver of economic growth [57-58] help us to understand the diversity and dynamics of new firm formation. It has been quoted that the entrepreneurs start their own business because "they cannot find a suitable role in the world of work, creating a new business is their best available option" [58, p.217].

There are a number of studies discussed the point of survival and growth of new firms, for

instance, Bartelsman, Scarpetta, and Schivardi [59] found a low level of survival rate of new firms. It was found that from the ten OECD countries approximately 20-40% of young firm failed during the first two years and only 40-50% continued to survive after seventh year of operation. Other studies found that over 50% of new firms exited the market within the first five years in UK [60-61], United States [62-64], and Italy [65]. Whereas the developing countries especially the small start-ups are likely to exit the market in a shorter time after the new-born period as a result of high cost [66].

Although the survival and success of business in an early stage of new start-up showed to be the lower, it is considerably important to economic growth as a whole [67] and beneficial to the economic development in developing countries [68-69]. The advantage of new business creation is not only to generate the employment but also to reduce the unemployment rate both in the developed and developing nations [70-71]. Lastly, even though most entrepreneurial firms are typically small [72] and having low individual market influence [73], they have potential to prosper the wealth of nation and urge the growth of economy [56].

E. Hi-technology Firms

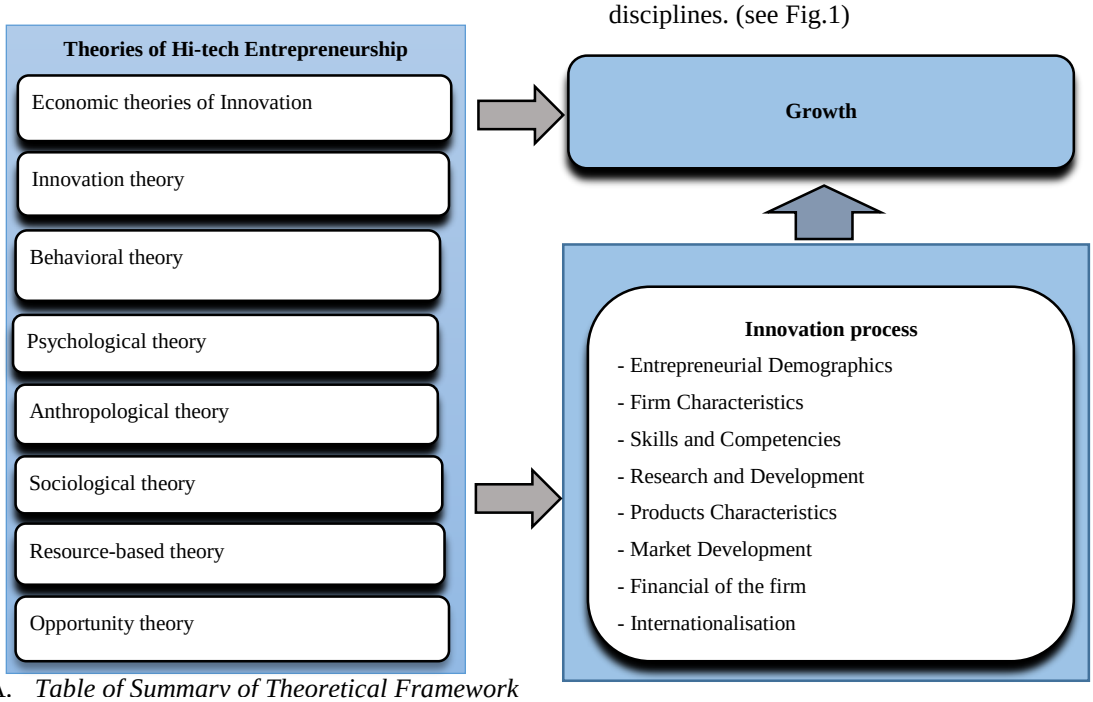
High technology sector is defined as the industry that invests proportionally high in the activity of science and technology than in the general way [74]. The term hi-technology firm is defined as an independently owned, whereby the owner(s) holds at least 50% of the company and operate in a high-technology sector [75].

There are a number of important issues on doing hi-technology businesses. Ganotakis and Love [76] explained that hi-tech firms are important driver to economic growth and because of the nature of the high-tech business; they generally face challenges in producing their highly innovative goods to serve the national and international markets. While other authors said that innovative firms experience only lower failure rates and contribute dramatically to the direct and indirect employment creation, moreover they drive higher sales, asset and export growth than other firms operating in more traditional industry sectors [75,77-78].

III. THEORETICAL UNDERPINNING OF THE MODEL

Nowadays, it is broadly accepted that there is a relationship among entrepreneurship, innovation, and economic growth. This paper synthesizes the different theories which have been developed to explain the causal chain of events through which entrepreneurs can deliver more innovation and ultimately higher growth to benefit the regional and national economies. The key predictions of the core theories of entrepreneurship and innovation will be used to formulate testable hypotheses which form the basis of the empirical testing in the three broad areas namely; characteristics of entrepreneurial high-tech firms, characteristics of innovative firms, and innovation and firm growth dynamics.

The key elements of the core theoretical perspective on the innovative process and the measurement of growth of high technology entrepreneurship are derived from the core theories on high-tech entrepreneurship of many disciplines. (see Fig.1)



A. *Table of Summary of Theoretical Framework*

Figure 1. Theoretical Framework

The empirical theories on hi-technology entrepreneurship are derived from many subject disciplines including economic theory of innovation, psychology, anthropology, sociology, resource-based view, opportunity identification, behavioral management and innovation, are used in the current research to explain the association between the theories' assumption and the causal chain of events are shown below:

TABLE 1 TABLE OF THEORETICAL FRAMEWORK SUMMARY

Theory	Main Assumptions	Theoretical Model (Author, Year)	Relevance in Research
The economic theory of innovation	To present the understanding of economic development in the area of technological revolution	Classical (cantillon,1755, Ricardo, 1817, Smith, 1776) Neoclassical (Parker & John, 1978; Murphy et al, 2006) Austrian Economic theories (Keizer, Tieben & Van Zijp, 1997; Kirzner, 1973)	Neo classical brought about new movement known as Austrian Market Process for criticize market systems, entrepreneurship and completion, and market development
Psychological theory	Personality traits to define entrepreneurship, there are 2 theories; Locus of Control and the need of achievement	Locus of Control (Rotter, 1996) The need of achievement (McClelland, 1961)	Characteristics of entrepreneurs driven by creativity and innovation, and management skills. While the theory of achievement associated with the new venture creation
Anthropological theory	Study of social and cultural contexts	Social and culture contexts (Simpeh, 2011)	Cultural environments can produce differences in entrepreneurial behavior
Sociological theory	Study of social network, life course stage, ethnic identification and population ecology for the business	Social theory (Reynolds, 1991)	The impact of factors of government legislation, customers, employees and competition on the survival of entrepreneurs
Resource-based theory	Predict the opportunity identification and the growth of new firms. It is composed of financial, social and human capital	the opportunity identification and the growth of new firms (Alvarez & Busenitz, 2001) financial, social and human capital (Aldrich, 1999)	Human capital (education and experience) and financial exploit entrepreneurial opportunity and business start-up
Opportunity identification theory	Process of opportunity recognition and development includes: entrepreneurial alertness, information asymmetry and prior knowledge, social networks, personality traits and opportunity	Opportunity theory (Ardichvili et al., 2003, Shane, 2000)	Prior knowledge and experience factors are significant capabilities of a successful entrepreneur
Behavioral theory	Examine the people's act and entrepreneurial actions	Personal action (Robbins & Coulter, 2007) Entrepreneurial actions (Bateman & Crant, 1993; Endres & Woods, 2003; Hebert & Link, 1998)	Entrepreneurial action associated with the relationship with suppliers for networking and financial management
Innovation theory	Innovation theory is concerned with the economic change; innovation, entrepreneurial activities and market power	Economic change theory (Schumpeter, 1934)	Bring businesses to improve their new products and processes into market system

We sympathize to claim that the earlier illustration of core theories assumption in entrepreneurship and innovation (Table 1) are necessary to explain the emergence of growth in hi-technology business. We believe that the theoretical framework can help us to generate the larger phenomenon of new firms that initiate entrepreneurial activities from the first five years of their operation.

B. Overview of Understanding of the Innovation

The following Table 2 presents the key characteristics of innovative firms to illustrate the innovation process. These key innovation inputs might result to different outputs as presented in the theoretical framework and the causal chain of events in the conceptual model (Fig.4). This prediction would lead the firms to enhance the economic growth, eventually bring forth regional and national growth. The innovation inputs are consist of entrepreneurial demographics, firm characteristics, skills and competencies, research and development, products characteristics, market development, financing, and internationalization.

TABLE 2 UNDERSTANDING OF INNOVATION PROCESS

Key Characteristic	Factor
Entrepreneurial Demographics	Education, Experience, Entrepreneurial founding team
Firm Characteristics	Age, Size, Ownership structure, Legal form
Skills and Competencies	Scientific knowledge, Business qualification
Research and Development	Incremental or disruptive change, R&D inputs, Customization, New or established
Product/Service Characteristics	Best-selling product/service, Product/service portfolio, Technological content of product/service, Novelty
Market Development	Number of customers, Market size, Number and type of customers, Domestic or international markets, Who is customer, Timing of first international sales
Financial of the firm	Debt, Equity, Personal inputs
Internationalization	Exporting, Export markets, Type of country sell in, Mode of international sales, Use of foreign agents

Entrepreneurial Demographics

The earlier psychological and opportunity identification theories claimed that prior knowledge [79] is one of the entrepreneurial alertness to business opportunity [80] and personal characteristics to define entrepreneurship linked to successful entrepreneur [81]. Stevenson et al. [82] concluded that the ability of new ventures to identify and select the right opportunities is the most important driver for entrepreneurial achievement. Similar to the resource-based theory [83] human capital, regarding to experience and education, is associated with entrepreneurship [84] to identify and exploit an entrepreneurial opportunity for new venture [80,85-86] to stimulate the growth of region [87-88]. While Knight [89] (1921) and Schumpeter [1] paid an attention on the potential characteristic of start-ups' founder. Thus demographic factors that use to predict the growth in this research are in line with human capital; education and experience, and entrepreneurial founding team. Several empirical researches have classified the importance of the entrepreneurial characteristic factors to predict entrepreneurship and business success. There has been determined the human capital is an important driver for young firms survival and improving their economic performance [90-92].

For instance, the empirical research using the panel of industries studied across twelve OECD countries found that human capital plays a significant role in productivity growth for countries [93] both in specific and formal human capitals as they are correlated to the outcome of radical innovation [94]. The number of research stated that human capital has been proposed as the foster of entrepreneurship in high-technology firms, for an example study by Massimo G. Colombo and Grilli [95] , they claimed that human capital is particularly considered as an important driver for the growth of innovative start-ups. In addition, Lussier [96] , doing a comparative research in US and Central Eastern Europe Croatian Entrepreneurs, found human capital factors; the experience and education are both significant variables for the US but not for Europe entrepreneurs to predict the success and failure of business. Moreno [97] also used these critical variables to analyse the entrepreneurial opportunity identification of new Spanish ventures, he argued that both factors related to identification and exploitation of opportunities. Kundu and Renko [98] examined the characteristic of entrepreneur to explain the export performance in Indian and Finish innovative firms, they found the educational background is considered as an important factor for the successful export performance.

The founders' experience has a beneficially impact on growth [99] and the factor of educational background either commercial or technical levels are all providing more opportunity for the UK new innovative firms to receive funds from the external finance [100]. The same result was found in the survey of Italian young hi-tech entrepreneurs, who have greater prior work experience in technical functions and greater university level education in management and economics [101] are growing larger than other firms and they have more chances to receive Venture Capital support [95], while industrial and marketing experiences are also considered as important drivers for business success for new innovative industries in United States [102].

Lastly, the higher level of the entrepreneurial founding team's work experience in Italian ICT start-ups empowered the survival of the industry [103]. The same trend was found in Norway and Sweden. Aspelund, Berg-Utby, and Skjevdal [104] found in their survey that, not only founding team's experience, but also a technology radicalness are greater importance to the innovative firms survival. Whereas the experience of founder and some management positions such as manager and financier in Israel new technology ventures are considered as significant driver to the success of business [105].

Firm Characteristics

The characteristics of new firms had been described in the theory of founding characteristics [20,106-107], however, this theory is not considered in the long term development of new business characteristics. Thus, the factor of firm characteristics such as age, size and ownership structure which determine the growth of young firms have been stated in various countries of these following studies.

To begin with the research by Lussier [108] , she pointed in her study for the US businesses that age is one of the factors that influence the success and failure prediction. First of all, the age of firm is positive correlated with survival and negative with growth, there has been cited in the research findings of some countries such as in Spain [109] , United Kingdom [110], Japan [111] and United States [112] that the firm's age is positively relationship with the business survival, by contrast it appeared to have a negative result with the growth of firms because the old firms grow less than younger counterparts.

The second factor is firm's size, the size of new firms is negatively correlated with survival and growth, this result is rejected Gibrate's law model [65-66,112-116], take for example in the research result of Calvo [109] for young Spanish innovative firms, found that the small firm has grown faster than larger ones. In contrast, there are studies argued that the business growth is typically determined by the size of firms at start-up [117], while firm size is significantly linked to a better business performance [118]. However there are studies that found no correlation between size and firm growth on the testing of Gibrate's law [62, 119]. Turning to the correlation between size and survival, vast studies have found a positive result between the size and survival [62, 120-121]. Meanwhile, Agarwal and Audretsch [122] stated that size and business survival are formed by the technology and the stage of life-cycle of new firms. They have found the interesting result in their research that the smaller firms in US held a lower rate of survival than the bigger counterparts. In addition, the following studies show the important of firm size and relevant factors for the business survival.

Firstly, to study the relationship between size, age and entrepreneurial structure, the research which has been done in Germany by Almus and Nerlinger [117], stated that age and

size of firms, and technical degree of hi-tech firms grow faster than non-innovative firms and also influence the increasing of employment rate in Germany. This result is confirmed by the research of Audretsch and Mahmood [62] for US manufacturers, they concluded that size and entrepreneurial structure influence the survival of business.

The correlation between firm's size and experience, Massimo G. Colombo, Delmastro, and Grilli [122] found in Italian young enterprises, the year of prior experience in same industry, and managerial and entrepreneurial experiences have more positive impacted to the size of firm, they convinced that these critical variables are positive relationship between firm size and business survival.

Turning to the link between firm size and innovation behavior. Sternberg and Arndt [123] found in their research that firms' characteristic is important to determine the innovation behaviour for European firms than other external factors, they pointed that internal factors such as firm size influenced the scope and nature of innovation as it correlated strongly to the quantity and quality of R&D, marketing and pursuing high volume of the qualified employees.

Size of start-ups also related to level of internationalisation [124-125]. The firm with small size, having limited product range and contain a narrow network distribution, facing obstruction to entre larger markets, while the larger counterparts gain more advantage to go for internationalisation due to they have ability to offer the greater diversity of products [126] and establishing more connections [127] to support the international markets entry [128].

Finally, the research in US on new hi-tech venture by Song et al. [102] indicated that size of founding team is also a crucial factor for the success of business. The firms which founded by a team, growing faster than the firms established by a single person, due to the insufficiency of individual know-how that could be compensated by other managerial team members [15, 129-130].

Skills and Competencies

The skills and competencies are important characteristics to define entrepreneurship as they are the vehicle of opportunity to derive higher level of creativity and innovation.

Littunen and Niittykangas [131] conclude in their research which have been done in Finland that there is a significant correlation between founder's know-how and high growth of firms in their young age during1-4 years.

There have been claimed by many scholars in the specific skill of new start-up firms, both in the managerial and technical/scientific skills, is better than the general ones to enhance their own performance [101, 117]. The important point of the specific skills such as technical and engineering skills, they affect the technical orientation of the firms [130], while entrepreneurs with highly educated in sciences and engineering background are more capable to learn and implement new technical knowledge [132]. This assertion is confirmed by the study of McKelvie, Wiklund, and Short [133] for Swedish start-ups firms, they found that technological and mechanical knowledge of new firms are the greatest conditions for improving the innovative efficiency of the firms.

Research and Development

Research and Development (R&D) is significant to develop the transfer of technology and create an innovation that is new to the firm [134]. According to Griffith et al. [93] studied productivity growth over twelve OECD countries, they said that R&D is an important driver for both technological catch-up and innovation by knowledge acquirement through learning-by-doing programme and the growth of R&D is generate through the technological transfer from neighbouring countries. Moreover R&D in service firms such as in the West German firms show the correlation to the export activity [135]. This argument is supported by the research of Kundu and Renko[98]. They claimed that the technological innovativeness is one of the crucial drivers for pursuing the success of export performance of Indian and Finish enterprises.

Meanwhile, the study of Manimala, Jose, and Thomas [136] reported that the innovation strategy impact to innovative enhancement for hi-tech industries in India, especially the type of incremental innovation, became the encouraging factor of strategic development for developing countries. Similar to this, the research by Robson et al. [56] which studied innovation and entrepreneurship in Ghana using a multilevel theoretical framework to analyse the different types of innovative activity which related to the characteristics of entrepreneur, found that incremental innovation is considerably important for the firm, in addition innovation is also associated with educational level, size of firm, and exports.

Moreover, Maidique and Hayes [137] stated that the entrepreneur who is more concentrate on one or two technological polices tend be obtained the most successful. This strategy is also able to dominate over risky and company, who invest higher on R&D than competitors do, can maintain technological leadership [139]. As the earlier explanation, the context of R&D is considered as a part of Innovation theory as it linked to the new science and technology, potential producer [46], enhancing the competitive advantage [138-139] and market power for a better outcome [1].

Products Characteristics

There are various aspects of product characteristics considered in this research such as best-selling product, product portfolio and technological content of product.

The factors of production has been described in the Classical and Neoclassical economic theories, it concerned the entrepreneurial activity which regarded as the vehicle of resources change into new product and services [140]. Furthermore, the theory of innovation and resource-based view are also related to product characteristic which help the entrepreneur to access resources for predicting the opportunity identification, firm growth [141] and to sustain the competitive advantage [142] by producing the temporary monopolies which necessary to improve new products and processes [143].

The important of product characteristics based on technological content has been established in many studies such as the research by Bürgel et al. [99]. They argued that the technological sophistication of product has probably impacted the growth rate of UK and German hi-tech start-ups. In addition the initial adoption of technological strategy can also determine the business efficiency such as in young US software ventures; their strategy is operated by integrating the production lines with new complementary products [144]. While the finding of research on innovative firms in Russia show that the business which produce better technological products and enter market later, performed the best [145]. Obviously, Kakati [146] convinced that the product criteria is not relative to the competitors that lead to the business success rather the ability of firm to meet the need of customers can actually bring to success or it can say that the product characteristic cannot stand alone to help entrepreneur to be successful, but the capability to develop multiple resources for backing up the strategies can help producer to push their products for reaching an achievement.

Market Development

This research tries to examine market development by focusing on factors such as number of customers, size of market, number and type of customers, domestic or international markets.

The theory background of market development is sociological theory, this theory focus on the survival of business by concerning the customers and competition [147], while the Austrian market process theory has also play the important role on the function of market-based system [1, 148] which is a crucial function for firms to create their new products to meet the trend of the market system.

Market development context has been found in the research of Gungaphul and Boolaky [149] which has done in Mauritius island, they found that the function of marketing is significant to Mauritius entrepreneurs for their business achievement, whereas the scope of marketing is considered as a crucial driver to the success for US innovative start-ups [102].

However, the challenge of marketing management results in hi-tech firm is the cooperation with R&D [150], so the business needs to work under a balancing between ‘technology push’ and ‘market pull’ within the context of innovation planning [151]. Then the process of technological strategic planning for innovative industries, require a period of time to work on the technological development and the effects of competitive advantage to reach the market position [152]. Up to this point, companies which entering market earlier than rivals, need to comply an oriented-competitive strategy to meet the industrial standard as fast as possible due to later followers are also raised their level to meet the customer satisfaction, if companies fail to achieve at this stage, the competition will take place into the market system and cut prices aggressively [151]. Lastly, the firms which seek to employ opportunity base on existing market knowledge and new technology market knowledge can gain more growth than firms that rely on new market knowledge [153]

Financial Resources

Financing context has long been reviewed in economic literature [154-155], especially it has been regarded in resourced- based view [156] and behavioural theories. Alrdrich [156] stated that the financial capital is capable for entrepreneurs to get more resources for the efficiency and effectiveness to start their own businesses,

whereas Tipu and Arain [157] concerned about the beneficial credit policy, paying method and financial management for owners.

The mode of finance influences the fundamental contribution to young hi-tech firms [158-160]. It has been generally known that financial resources support the growth of start-up firms [161-162]. Many studies stated new entrepreneurs operated within limited resources [163-164], unless the firm who provide stronger resource-based is more able to survive [164], therefore the capacity to get more resources of founding team is very important to competiveness and growth of firms [165-166].

There are number research have recognized important of the financial issue for new firms such as Ganotakis [167] claimed in his research for UK hi-tech new ventures that financial capital is typically an important factor for the business survival and growth. The same result of the sample in US innovative start-ups, financial resource is typically a crucial driver for the business success [102]. Obviously, a number of scholars have remarkably clarified that young hi-tech firms seem to face serious problems to access external financial sources, especially debt financing 168].

In addition, Massimo G. Colombo, Grilli, and Verga [169] found that the competency of Italian young innovative founders is a significant determinant for Venture Capitalist on their financial decision, moreover the start-ups who have a high rate of human capital, have more chance to be selected by the VC investors [170-173].

Internationalization

From the review in literature of theoretical implications by Oviatt and Mcdougall's article, the internationalisation brings a business to a positive performance in the long run through value creation. Thus the new hi-tech firms who create later internationalisation is more probable to survive and grow than the earlier ones [174]. Similar to research result for Chinese enterprises, the entrepreneurs with highly experience on exporting and having a large networks, are less likely to start export early because they think internationalised at early stage may harm the firm's development [175].

Meanwhile, the study of Coeurderoy, Cowling, Licht, and Murray [176] on the determinant of internationalisation and firm survival of young innovative firms in UK and Germany stated that a good relationship between customer and suppliers produce a higher chance of survival, while Bürgel et al. [99] also using the sample in UK and Germany innovative start-up firms, they found that entrepreneur who sell overseas, gaining greater sales growth than those who sell only in domestic market. In addition, according to the networking factor of internationalisation in German, start-ups with a good supportive networks and founder with a broad network and more social support tend to achieve more survival and growth [177]. Currently the international competition for UK and German firms are highly significant and the frequency of exporting overseas increase over periods [178]. While, characteristics of product and R&D activities are considered as the firm success factors because they can distinguish themselves from rivals when selling abroad [179] such as the study of US technology start-ups illustrated that the factor of size, R&D and prior experience impact on the local resources more effectively and they also raise the capacity of internationalisation competitiveness [128].

The earlier review from various papers finding, it is to confirm the dimension of core theoretical expects in difference key characteristics on understanding of the innovation process for innovative start-ups, revealed additional feature that benefit consideration of entrepreneurial activities and technological innovation to brought about the conceptual model of this paper.

IV. THE CONCEPTUAL FRAMEWORK OF THE MODEL

With regard to the crucial based factors of entrepreneurship and innovation, we consider the extent that firm level factors are associated with the longer term growth of young high technology firms.

The model examines the relationship among different levels and configuration of innovation inputs and innovation outputs in the new market development. Figure 2 establishes how entrepreneurial firms embark on the path that leads from innovation inputs to innovation outputs in the form of new market development by offering new products / services or delivering existing products / services in innovative new ways. The impacts of being more innovative, the final link in the causal chain of events, is forecasted would lead to superior, or enhanced, economic growth at the firm level initially, but ultimately to regional and national growth.

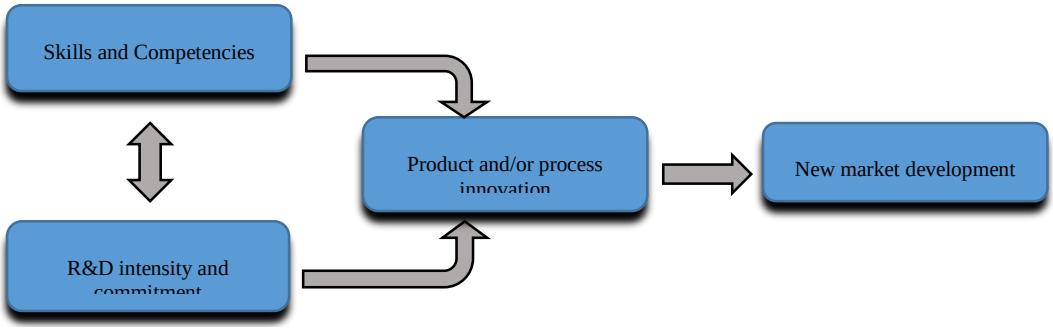


Figure 2. Innovation Inputs and Outputs

According to the above figure, it is hypothesize that firms must first accumulate productive resources and then deliver more innovation outputs which enable the firm to develop new markets or eventually compete more effectively in existing markets (refer to fig. 3).

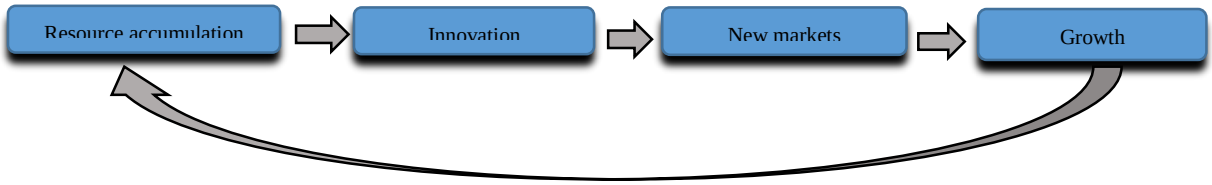


Figure 3. The causal chain from resource accumulation to growth

From Figure 2 and 3, they are predicted that this entrepreneurship-innovation-growth causal chain will create a self-reinforcing dynamic. Previous studies have often identified a pattern of persistent growth from a small subset of unique and highly entrepreneurial and innovative firms.

The model will finally link the chains of events that lead the business to economic growth (refer to Fig.4).

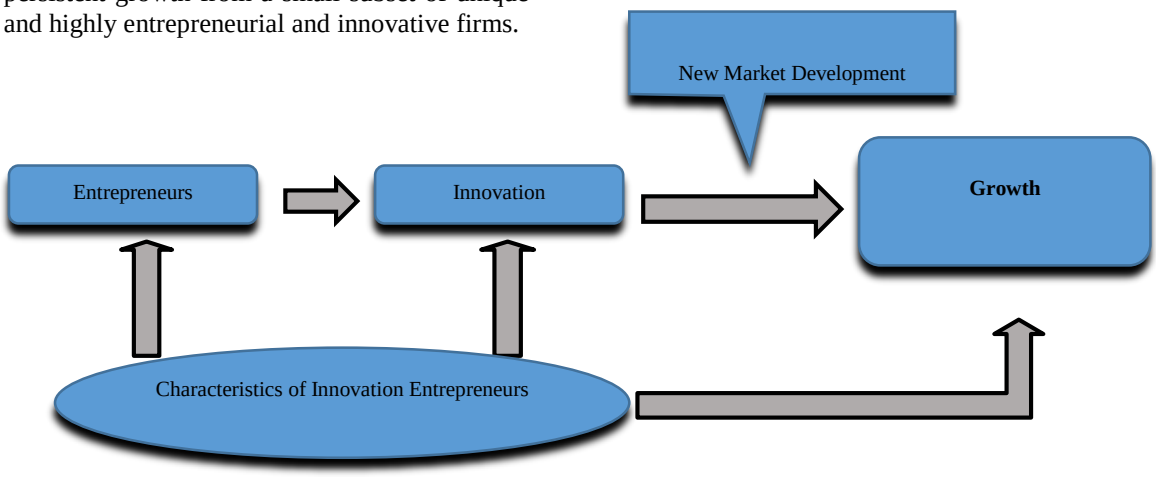


Figure 4. The Conceptual Model

The framework of this model is developed to analyze the core theoretical aspects on innovative entrepreneurship that are well developed in the economics and management literature in Entrepreneurship, Innovation and Growth. This framework draws on the various theories from a range of subject disciplines including economics theory of innovation, psychology, sociology, anthropology, resource-based view, behavioral management, opportunity Identification and innovation (see Table 1).

In summary, this model is to examine the key characteristics of innovative firms from the sample in different areas namely; entrepreneurial demographics, firm demographics, skills and competencies, research and development, product characteristics, market development, internalization, and finance. Then, it explores the key characteristics of firms in the aspect of innovation context, focusing

more on inputs to the innovative process and later considers how different level and configurations of innovation inputs may influence the different outputs both in scale and breadth. Finally, it establishes how innovative firms broaden innovation inputs through innovation outputs in the form of new market development by launching new products/services or improving existing products/services. The explanation will present the link of casual chain of events that could predict the growth of economy at the firm level both in regional and national growth.

V. DISCUSSION AND CONCLUSION

Currently, there are many different scholarly theories debating the elements of success and failure of entrepreneurship, innovation and economic developments in many different areas, for example, internationalization, firm ownership, employment and human capital.

However, the earlier review of the literature in various papers, have identified a numbers of gaps in the existing research on the development of young hi-technology entrepreneurship. It is found that these theoretical models which explain the growth of young innovative firms do not have sufficient width and breadth. There is number of exploratory studies in the area that have addressed the measurement of survival and achievement of young hi-tech firms in developed economies, but not in the developing country study is known to the researchers which systematically surveys the population of new business in hi-technology industry and the important of the phenomenon on the development of new hi-tech firm still under recognize by authors. Importantly, there is only a small amount of work studying factors enabling and constraining the growth of these firms in the long run.

Therefore, the model presented in this paper has identified the key firm-based factors associated with the long term development of high-tech startups utilizing the entrepreneurial and innovation inputs and outputs to measure the business growth. It will examine how competing theories drawn from economics and Innovation management have been developed to describe the chain of different events through which entrepreneurs brought about more innovation and ultimately succeeded in reaching higher growth to benefit the regional and national economies.

It will then consider how innovative firms differ in terms of their core characteristics of entrepreneurial hi-tech firms, characteristics of Innovating firms, and innovation and firm growth dynamics as these existing theories have been developed to explain entrepreneurial and innovation dynamics in the Western country economies and explain the key elements that lead to improved economic growth in developing countries. Finally, it will investigate whether the new high-tech firms in developing country can make a meaningful contribution to the future economic growth potential of the country.

Consequently, the model presented in this paper has filled a specific gap by creating a new theoretical framework which utilizes the key elements in the core theoretical assumptions on high-tech entrepreneurship. It, initially, explores the inputs to the innovative process then it demonstrates how different configurations of the innovative inputs may lead to different outputs. Then it shows how entrepreneurial firms use inputs such as new market to innovatively create new products or launch existing products or services in new ways. Finally, it demonstrates how the link of the causal chain of events can predict the economic enhancement at the firm level.

This paper is not only significant for the young entrepreneurs but also for the governments to design policy to support hi-technology industries in both the products and services sectors. Innovation is essential for the young start-ups to secure growth from their superior entrepreneurial and innovative capabilities. Thus, if the government is interested in promoting the success of young SME high technology entrepreneurs, it should encourage the innovation process in hi-tech start-ups which can make a significant contribution to the future economic growth of the country.

Last but not least, the study suggests that there is ample room to increase both awareness and understanding of the important role of the young hi-tech entrepreneurs for SME since they are the important elements in the success of businesses. We hope that the policy makers could use the research results to help young SME hi-tech firms and provide training for new enterprises and graduates in their countries.

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