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Table of Content

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Influence of Crowdfunding on Innovative Entrepreneurship Eco-Systems in India

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Abstract
Crowdfunding, an inventive concept refers to a practice of generating capital investments or funds from many individuals for a project, a cause or a startup enterprise. Crowdfunding for startup is adopted when an idea that has the potential to create jobs and generate revenue but needs financial support to become a reality. It is an emerging and innovative online platform for small business founders and startups to invite funding from outsiders. According to Massolution crowdfunding report 2015, the global crowdfunding industry grew immensely in year 2015 with 34.4 billion in business and entrepreneurship domains of crowdfunding.

Journal of Asia Entrepreneurship and Sustainability

Concept innovation and its unparalleled rate of growth remained major inspirations to explore the industry in general and in particular to *Indian startups. India is seen as the biggest and definitive platform for startups and initiative of crowdfunding companies in India have fueled its growth. Thus till what extent crowdfunding helps business idea to see the reality became impetus of the research. Exploratory research design has been adopted and personal interview and case study method is used to detail the concept. The research is confined to the case studies of leading crowdfunding platforms for startups like Catapooolt and Ketto in India. The research output has given insights into the growth of crowdfunding in India, types of projects funded, business model and outreach strategies of crowdfunding platforms, key challenges and few success stories. The presented success stories through crowdfunding may lay a platform to the entrepreneurial ideas to step forward towards crowdfunding to make it a reality*.

1. Introduction:

New ventures require resources to succeed, and one of the most critical of these is financing (Gompers and Lerner, 2004; Gorman and Sahlman, 1989; Kortum and Lerner, 2000). A start up is a young company that is just launched to develop. Start-ups are generally small and initially financed and operated by a handful of founders. At the inception stage, starts up companies' expenses normally tend to exceed their revenues due to emphasise on developing, testing and marketing of the

business idea. New ventures require resources to grow and succeed, and one of the most critical of these is financing. And as funding is a major concern for start-ups As per the report by industry body NASSCOM, India ranks third among global start ecosystems, with more than 4,200 new age companies. And for a successful start-up ecosystem there is a need for enough angel investors who can support budding entrepreneurs from an early stage. But this is not happening in India and there is a serious lack of it. Mainly, investors (in India) are afraid because there is a high risk of failure in these investments"

Although online platforms of crowd funding have come up very recently, they have started to revolutionize the traditional practices of gathering funds to finance an organization (Howe, 2008). Instead raising capital from small group of wealthy individuals it gathers funds from a pool of individuals across the world. Popular organizations like Ketto (Ketto.org, India) and Catapooolt (Catapooolt.com, India) are those relational mediators that act as facilitators between supply and demand by bringing entrepreneurs and customers or investors together.

2. Crowdfunding for start-ups: Concept outline

According to Ordanini (2011) the concept of crowd funding is a collective effort of various individuals, who come together to pool the funds, to support new potential projects, organizations and businesses. In the meantime it has become an alternative source of financing for startups that have this particular limited access to traditional lines of financing (Belleflamme et al., 2010; Schwienbacher and Larralde, 2010; Mollick, 2012).

More conceptually, Lambert and Schwienbacher (2010) extend the definition of crowdsourcing provided by Klemann et al. (2008), by describing crowdfunding as *"an open call, essentially through the Internet, for the provision of financial resources either in form of donation or in exchange for some form of reward and/or voting rights in order to support initiatives for specific purposes"*.
Crowd funding for start-up is adopted when an idea that has the potential to create jobs and generate revenue but needs financial support to become a reality. It creates a community around the business of start-up enterprise and also helps in spreading the word about its operating dynamics by initiating its social media presence, investment base and funding prospects. Crowdfunding companies provide a platform to transform unique ideas into reality. Their role is to help getting funds to the people having innovative ideas to transform them into reality and at the same time, to ensure the contributors that their funds are in right hand. An ongoing study by Lambert and Schwienbacher (2010) indicate that many projects financed by crowd funding do not offer any reward to their investors, but rather live from donations. Other considerations than financial ones often seem to be of importance for crowd funders.

3. Review of Literature

(Confederation of Indian Industry-CII, Start-up conclave, 2015) in report titled " A snap-shot of India's start-up ecosystem" highlighted that one of the most commonly observed constraints for start-ups is finance. Start-ups looking for funding of less than Rs.50 lakh therefore often struggle to access investors. In fact,

start-ups in India spend five times the amount of effort to raise funds as compared to US start-ups. (Cosh, Cumming and Hughes, 2009) One of the main hindrances that the start up environment faces is raising capital in their quest to change the world, many entrepreneurs who seek to start a business end up with no external support. (Belleflamme, Lambert and Schwienbacher, 2013) call this "community benefits", and is an advantage of crowdfunding over traditional funding, as this involvement can enhance the crowd funders' experience with the good.

(Gerber and Hui , 2013) in their study pointed out that what motivates crowd funders get is rewards in addition to the desire to help others being a part of a community and support a cause ,(Agrawal Ajay & Avi Goldfarb, 2011) studied 'The Geography of crowdfunding' concluded that the local investors are motivated early to invest in the project initiated by the person of their territory compared to other investors. Thus the geographic limit of crowd funding is personal connection of an investor to the entrepreneur.
(Agrawal, A., C. Catalini, and A. Goldfarb, 2013) in their working paper on simple economics of crowd funding stated that it is well recognized fact that new firms face di*ffi*culties in attracting external finance during their initial stage. Instead of raising money from one entity or a small group of sophisticated investors, crowdfunding helps firms obtain money from large audiences (the "crowd") through online platform, in which each individual provides a very small amount. (Nasscom-Vice President Rajat Tondon) told Press Trust of India that unlike the west, India does not have enough number of angel investors who can fuel the

growth of the country's thriving start-up ecosystem as India rank third among global start-up ecosystem. In countries US people are just waiting to invest in some good companies. In India there is a need for High Networth individuals and corporate executives to come forward and participate in this growth story by leveraging platforms like crowdfunding not only by encouraging investors financially but also by mentoring start-ups. According to Kleemann et al. (2008), participants in crowdsourcing projects have either intrinsic or extrinsic motivations. Intrinsic motivation relates to the pleasure or fun of doing the particular task, whereas an extrinsic motivation calls for an external reward, as money and goods, career benefits, learning, recognition or even dissatisfaction with current products

Lead generation

Thus burning need of funding to start-ups and initiative of crowdfunding a stepping stone towards the need became major generated the lead to explore the concept crowd funding and analyse its contribution towards the uplifting of start-up eco-system in India

4. Crowd funding models in operation in India

Crowd funding in India is still in a nascent stage. The models currently in operation are the Donation based Crowd funding and Reward based Crowd funding

Donation based Crowd funding

This works on basic philanthropy, whereby people give money towards a good cause. In this model, people contribute their funds to a project without any

expectations of financial benefits. In this model, two major factors seems to drive donors

- Satisfaction of helping a good cause (most of charities)
- Receiving news, tangible proofs that the money was efficiently used

Reward based Crowd funding

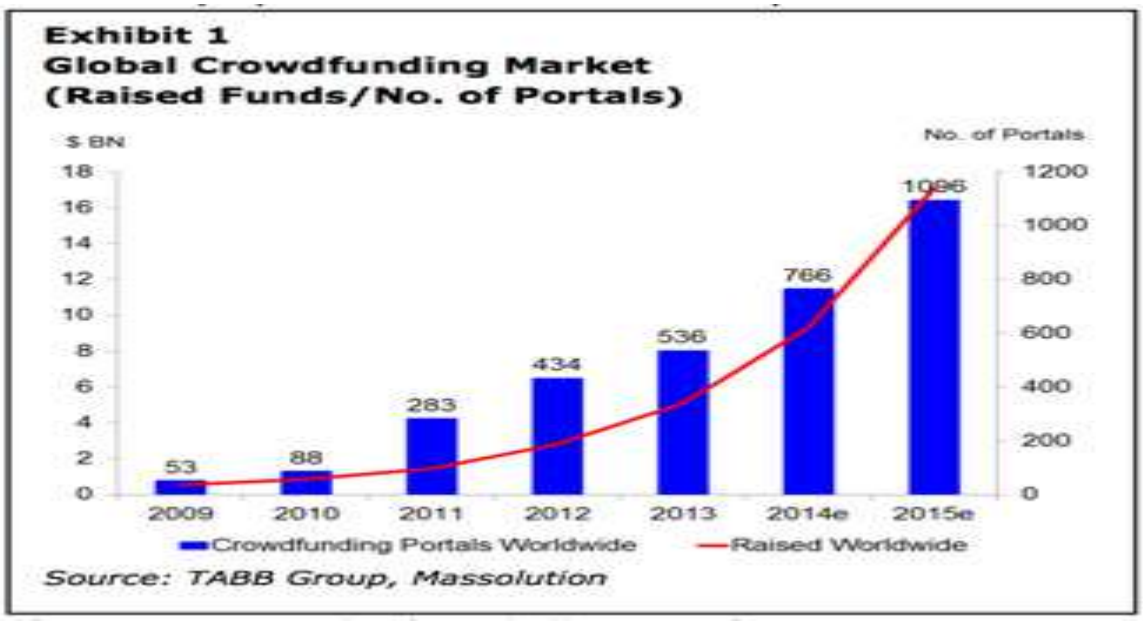
Most popular model is reward-based crowd funding. The basic modus operandi of reward model goes like an entrepreneur posts a project available for funding up on a crowd funding platform with a set deadline. Frequently, special promotional videos are produced to help get sponsors interested in the project. In return for sponsoring a project, these sponsors receive different rewards depending on the amount of funding they commit (defined by the business or entrepreneur behind the project). Interested sponsors donate in the project and share the projects with family, friends and on social networks. If funding targets are hit before the project's deadline, the deal "tilts" and monies are exchanged, rewards are committed.

5. Growth of crowd funding industry worldwide and in India

Crowdfunding's popularity as a way to fund creative, philanthropic, and social endeavors still prevails but crowdfunding's application for entrepreneurial ventures began to gain significant traction over the last few years. Business and Entrepreneurship had become the lead category by 2012 at 27.4% of total crowdfunding volume and in 2014 had increased in importance, accounting for over 40% of worldwide funding volume. In 2014, the lead categories share of funding volume was as follows:

- Business & Entrepreneurship at 41.3% / $6.7bn
- Social Causes 18.9% / $3.06bn
- Films & Performing Arts 12.13% / $1.97bn
- Real Estate 6.25% / $1.01bn
- Music and Recording Arts 4.54%/ $736m

Total Global Crowd funding Industry estimated fundraising volume in 2015: $34 Billion



(Source: http://www.cfo-india.in/articles/1000098/the-changing-dynamics-of-fundraising)

Crowdfunding is thus an emerging and innovative concept in India that provides small businesses and startups with opportunities to showcase their product/service, to increase social media presence, investment base, and funding prospects.

Globally crowdfunding grew 81 per cent in 2012 and more than 100 per cent in 2013. In India, the growth rate has been more than 120 per cent with only social and reward-based crowdfunding. (Source: http://www.cfo-india.in/articles/1000098/the-changing-dynamics-of-fundraising)

6. Research Methodology:

The research was aimed at exploring the concept of crowdfunding specific to start-ups in India and analysing the potential of crowdfunding in fuelling the start-ups by understanding various success stories of entrepreneurial ideas seeing reality. Crowdfunding concept has been explored specific to start-ups in India. Conceptual understanding is taken with the help of secondary data sources. Practical insights into its applicability have been taken through primary data collection method. With the use of structured interview method through e-mail correspondence and tele-con India's leading crowdfunding companies namely Ketto and Catapooolt have been approached and given feedback has been narrated in the form case study along with their success stories

7. Case study Analysis:

Two leading online crowdfunding platforms for startups in India namely Ketto, and Catapooolt have been interviewed and their conceptualization, operating framework, growth and success stories in generating crowdfund have been analyzed and presented below

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Case study I - Ketto- Story behind its inception and growth

KETTO-We believe in the power of you

Head office: Mumbai

Founders: Varun Sheth, Kunal Kapoor (Bollywood actor) and Zaheer Adenwala

Contact method: Tele-con and correspondence through e-mail for conducting structured interview

Question 1: How did the idea of crowd funding come about?

Answer1: The story of Ketto is the handiwork of fate. Bollywood Actor Kunal Kapoor, who supports several charities, had been noticing the challenges NGOs repeatedly faced while fundraising, and wanted to ease their struggle. At around this time, it began to dawn on finance professional Varun Sheth that he didn't just want to make crores for his clients; he also wanted those crores to have a significant social impact, to better the world in some way. Within the same timeframe, Zaheer Adenwala, a technology professional, had been tinkering with the idea of transferring the fundraising model onto an online platform. He wanted to take the country's social sector into the age of technology. That's how Ketto came into existence

Question 2: Please Share your milestones in terms of Total rupees pledged, Total number of backers, Total number of projects. What kind of projects related to startups do you accept? How much money has been raised so far for startups projects so far? Which categories have attracted the highest amount of money pledged on your company in case of startups?

Journal of Asia Entrepreneurship and Sustainability

Answer 2: Ketto's Operating Framework and Key Milestones

Ketto's Operating Framework	
Market reach	Asia's most visited and trusted crowdfunding platform
Key target markets for start-ups	1. FMCG and technology based startups 2. Social entrepreneurial projects 3. Innovative ideas driven projects from any sector
Business model	1. Donation based crowdfunding platform 2. Reward based crowdfunding platform A success fee of 6% on the total funds Raised
Categories of projects attracted highest crowdfund in start-up category	1. Innovative Product based startups 2. Pre-Order basis
Ketto's Crowd funding milestones in general	
Crowd funding offered to	30,000+ Individuals, NGO's, Corporate

Total Crowdfund/Rupees pledged	Rs.100 Crores
Total crowd fund sponsors	2,00,000+
Ketto's Crowd funding milestones specific to start-ups	
Total Crowdfund rupees pledged for start-ups	Rs. 17 lacs
Total number of start-up project funded	1627 entrepreneurial and creative projects funded
Total number of crowdfund sponsors	30,000+ supporters

Source: Compiled by the researcher from primary data collected from the founder

Question 3: What is your company's USP in the Indian market?

Answer 3 : Ketto is Asia's largest reward and donation based crowdfunding platform, as per research firm crowdsurfer.com. It follows the flexible funding model. It's the only crowdfunding platform in India raising funds for Social, Creative & Personal Causes.

Question 4: Could you please tell us about the company's outreach strategy?

Answer 4: Since their property is online, digital promotions are a big chunk of their outreach strategy - They use social media, SEO and SEM and send newsletters to their database. Apart from that, for interesting stories on their platform, they approach content platforms that would be interested in funding.. They also collaborate with charity partners/design studios/production houses to bring campaigns alive on the internet.

Questions 5: Do you face any challenges from the regulatory side? (SEBI regulations of crowdfunding)

Answer 5: The only limitation Ketto faces from SEBI is the implementation of equity based crowdfunding which is not permitted in India.

Question 6: Can you please elaborate on your future plans?

Answer 6: Ketto aims to be a financial marketplace where SME, Individuals & Non-Profits can raise funds via equity, debt and donations

Question 7: Can you please narrate your one best success story of startup funded by your company?

Answer 7: BAKEYS FOODS PRIVATE LIMITED FUELED BY CROWDFUND THROUGH KETTO

Founder: Narayana Peesapaty

Company Bakeys foods private limited

Product: Edible Cutlery- A healthy, nutritious and eco friendly alternative to plastic disposable cutlery

Idea generation

As plastic contains chemical complexes, several of which are neuro toxic and carcinogenic. These leach into food. In fact, even food grade cutlery is that, where this leaching is within permissible levels of 60 Parts per Million (PPM). At this point he decided to find alternative to the plastic spoons which is safe. The idea of replacement of plastic spoon with edible spoon struck the founder while he spotted a few people use khakra to pick food served on a flight. This pushed him to work on an organic spoon made of food, as an alternative to plastic spoons.

Product description

Eatable cutlery is made of flours of jowar (sorghum) blended with rice and wheat. They contain no chemicals/preservatives/fat/plasticizes, emulsifiers, artificial colour or milk products. In fact they contain nothing that is not a plant product (except salt, which is added for taste). It is 100% natural, biodegradable/ vegetarian and Vegan.

Table-2 Idea development and implementation

Concept Innovation	First technology development all across the world First prototype machine that can manufacture the spoons 100% natural , eatable and biodegradable
Rationale behind the concept	Environment friendly cutlery, a move towards replacing 120 billion pieces of disposable plastic cutlery that gets discarded in India
Crowdfund raised through Ketto	Bakeys crowdfunding campaign on Ketto successfully raised Rs. 24,92,380
Crowd fund Supporters	Crowd fund for Bakeys was supported by total 1571 backers from India and Outside India
Strategy implementation	Low cost strategy (As cheap as plastic spoon)

	➢ Low cost through Energy efficiency and Manpower rationalization so as to make it as cheap as plastic spoons ➢ Zero base supply chain - Direct buying from farmers and direct delivery to the customers ➢ Edible cutlery primarily made with millets instead rice as rice consumes 60 times more water than millets to cultivate
Operations	Phases of development ➢ Evolved with new machine design, 24x7 production for month and a half ➢ Later stage machine is made more robust and wear-resistant for a significantly long time
Employment	9 women from lower middle income groups have been employed
Volume	Over 1.5 million units of edible cutlery have been sold

Source: Compiled by the researcher from primary data collected from the founder

Growth

With the help of crowdfunding, idea was able to see the reality and started growing

➢ Single manufacturing unit started in India and sold products in India and expanded at globe scale

- Increase in volume helped to stretch its product line with introduction of other products

Future plans

- Working to integrate the packaging with this machine so that in we put the kneaded dough, out comes the packed spoon!
- Increase the product line by introducing other cutlery products like the forks, soup spoons, dessert spoons etc

Case study II – Catapooolt- Story behind its inception and growth

Catapooolt-Let's start the next
Head office: Mumbai
Founder: Mr. Satish kataria
Contact method: Tele-con and correspondence through e-mail

Question 1: How did the idea of crowd funding come about?

Answer1: The founder brought crowdfunding in India in 2010 for the first time – impressed upon by its power to engage millions of people to be able to support ideas. He envisioned that crowdfunding could boost Indian entrepreneurial ecosystem – by empowering ideas to not just depend on limited number of angel investors and engage with larger communities

Question 2 : Please Share your milestones in terms of Total rupees pledged, Total number of backers, Total number of projects. What kind of projects related to startups do you accept? How much money has been raised so far for startups

projects so far? Which categories have attracted the highest amount of money pledged on your company in case of startups?

Answer 2: Catapooolt's Operating Framework and Key Milestones

Catapooolt's Operating Framework	
Market reach	In India, Catapooolt is the primary platform reaching out to startups for crowdfunding
Key target markets for start-ups	Initial focus was on metros Now attempting to draw our focus towards Tier 2 and 3 cities – where we feel that true innovation is not getting an apt platform to get discovered and thus we can play a strategic role.
Business model	A listing fees from the projects that come for listing – and then a platform fees (average 10%) on the total amount of funding that projects raise on the platform.
Categories of projects attracted highest crowdfund in start-up category	B2C start up ideas

Catapooolt's Crowd funding milestones specific to start-ups	
Total Crowdfund rupees pledged for start-ups	Raised INR 150 Lakhs
Total number of start-up projects funded	70 various ideas
Total number of crowdfund sponsors	2500+ contributors

Source: Compiled by the researcher from primary data collected from the founder

Question 3: What is your company's USP in the Indian market?

Answer 3:Catapooolt's network with angel investors, mentors and partners such as Times of India – render them additional visibility as well as capability to help early stage startups along their journey – right from ideation to pre-series funding.

Question 4 : Could you please tell us about the company's outreach strategy?

Answer 4: Catapooolt leverages multiple channels – including PR, events, online channels and print media – to reach out to prospective audiences

Question 5: Do you face any challenges from the regulatory side? (SEBI regulations of crowdfunding)

Answer 5: Currently catapooolt is a rewards based non-equity based platform and hence do not face any regulatory hassles – but yes – SEBI's reservations against crowdfunding is a stumbling block – not just for the platform but also for nation's entrepreneurial landscape. They are working with various industry associations to

approach to SEBI for constructive dialogue on framing a robust crowdfunding policy for India.

Question 6: Can you please elaborate on your future plans?

Answer 6: Catapooolt envisioning to have atleast 500-750 start-ups get listed – and especially support early stage start-ups from Tier 2 and 3 cities.

Question 7: Can you please narrate your best success story of startup funded by your company?

Answer 7: GREENSOLE FUELED BY CROWDFUND THROUGH CATAPOOOLT

Founders : Shriyans Bhandari and Ramesh Dhami

Company: Greensole- Step towards sustainability

Product : Greensole- Conversion of old sports shoes into re-usable slippers

Idea generation

As athletes, founders ran hundreds of kilometres every year. They also ran through at least three to four pairs of sport shoes every year. The soles were in good condition but the shoe sides tore within months. A bit of research led to the idea of refurbishing them into trendy slippers. That brainwave eventually spawned an eco-friendly enterprise that reuses shoe soles and is appropriately named Greensole

Product description

Greensole is a social venture, which recycles discarded shoes to comfortable footwear and provides them to the under-served to protect them from diseases caused by unprotected feet.

Table- 4 Idea development and implementation

Concept Innovation	Social innovation- which recycles discarded shoes to comfortable footwear
Rationale behind the concept	Worldwide every year more than 35,00,00,000 pairs of shoes are discarded, while as per the recent report by WHO, 1.5 billion people are infected by diseases that could be prevented by wearing proper footwear. Manufacturing a pair of shoes involves a total of assembling upto 65 discrete parts in 360 steps, which generates 30 lbs of emissions; equivalent to leaving a 100-watt bulb burning for a week.
Crowdfund raised through Catapooolt	Greensole's crowdfunding campaign on Catapooolt successfully raised Rs. 1, 86,377. After their initial funding support from Catapooolt, they went on to gather support from several sources – including business celebrity Mr. Ratan Tata – who congratulated them on their innovation
Total fund amount raised from various sources	INR 20,00,000
Footwear provided at inception	10000 pairs

Footwear provided in 2016	50000 pairs
Co2 Emission saved(lbs)	45000 pairs

Source: Compiled by the researcher from primary data collected from the founder

Awards and recognitions

- Technology and Sustainability Award at Eureka, Asia's largest B-plan competition by IIT, Bombay.
- Among top 25 start-ups of India by Tata First Dot
- Among top 30 innovators of India by EDII, Ahmedabad
- 2nd place at Ridea National B-plan competiton
- 1st place at ESENSEX B-plan competition by Jai Hind College and NEN

Future vision

To recycle discarded shoes with an absolutely minimum carbon footprint, to give livelihood to the underprivileged sections of the society and to ensure that no one in need is barefoot by 2023

8. Overall Findings & Discussions:

This paper has studied the emergence of a new kind of business funding, the crowd funding. It has been argued that funding was particularly difficult to obtain for

small businesses in respect of their size and lack of available historical data creating information asymmetry for potential investors.

In this struggling phase, based on the above narrated success stories, it can be said that crowd funding can become a viable fundraising method obtainable for small entrepreneurial companies or project-based initiatives. It is found that good idea that is having market feasibility fetches attention of supporters and gets success in raising the fund. It can be further said that concept innovation as filler to the latent demand is a major attraction to the crowd funders as described in the success stories

Further it is found that Reward based crowdfunding is having more presence than donation based crowdfunding for start-ups in India. Among all categories Technology based start-ups are still facing more challenges to convince the supporters. both players have expressed that crowd funding industry is facing challenges from SEBI as India does not have draft regulatory policies for crowd funding. And Equity based crowd funding is still facing bottlenecks in India in the absence of regulatory framework.

Apart from Tier I cities , now crowdfunding platforms are planning to expand their reach to Tier II and III cities as well where true innovation is not getting apt platform to get discovered. This move will help to expand the concept of crowdfunding even in small cities and thus the real creative and innovative ideas will get chance to turn it in to reality.

9. Conclusion:

As per the report by industry body NAASCOM, India ranks third among global start-up ecosystems and aaccording to “Make in India” report, it is expected to have 2 lacs start-ups by 2020 resulting into funding requirement of approximately Rs. 20,000 crores. India’s current weak funding eco-system may harm the inception and growth of these start-up ideas and ultimately overall industrial growth of economy in comparison to global scale. The situation is demanding in India and there is a need for more initiatives to expand crowdfunding platforms to fuel the fund. Such crowdfunding platforms should also take initiative to convince corporate executives to come forward on the crowdfunding platform not only to encourage start-ups financially but also by mentoring them. Such initiatives might help revival of start-up eco-system in India

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Entrepreneurial Attitudes and Survival of Small And Medium Scale Enterprises In Nigeria

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Abstract

The study investigated the relationship between entrepreneurial attitudes and the survival of small and medium scale enterprises in Port Harcourt. The cross sectional survey method was adopted. A sample size of eighty was drawn from a population of one hundred employees using the Taro Yamane formula. The questionnaire was the main instrument for data collection and data obtained was analysed using the SPSS. Spearman's rank correlation coefficient was used to test the hypotheses. Our findings revealed a strong and positive relationship between the measures of survival and dimensions of entrepreneurial attitude. We concluded that entrepreneurial mind-set and operations might significantly and

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proportionately predict the organizational performance and success level of a firm. We recommended that banks should be willing to partner with them by giving the loans to finance their innovations as this has been their major problem. Managers should provide enabling environment and encourage their employees to develop and maintain entrepreneurial attitude as this will help the organization to survive. Government ought to as matter of criticality help planned business visionaries to have admittance to the public purse to back them up. This could enable them identify business opportunities, present day innovation, crude materials, plant and hardware which would empower them.

Key words: Entrepreneurial attitude, survival, small scale enterprise, medium scale enterprise

1. INTRODUCTION

The existence of small and medium enterprises (SMEs) is so important to the nation and that it is sometimes described as engine of growth of most economies of the world (Ibrahim, 2015). However, the take off and efficient performance of any industrial enterprise requires a sound accounting technique, tools and system. At the centre of every economy, a subtle concept that attracts the attention of all tiers of government, desire of citizens and attention of scholars is Entrepreneurship, this is borne out of the fact that evidences point to the positive influx of entrepreneurship in an economy which manifest through reduction of unemployment via job creation. Entrepreneurship promotes output level across

sectors in an economy thus stimulating growth and fostering national development as asserted by Zubair (2014) and Baig, (2007), Entrepreneurial endeavours are largely dominated by the private sector and usually mushrooms on the Small Scale Enterprises and other sectorial activities like the agricultural sector that host few employees and are characterized by small capital base.

Man, Lau & Chan (2002) identified entrepreneurial orientation as an important factor necessary for organizational survival. They further viewed entrepreneurial orientation as the summation of the extent to which top managers are inclined to take business-related creativity, innovativeness and risk-taking that will result into organizational survival. Several researches on organizational survival have taken place in the recent past (McGrath and McMillian 2000; Damanpour, 1991; Zahra and Covin, 1995; Man, Lau & Chan, 2002). Many of these studies revealed that entrepreneurial attitude have positive and significant impact on organizational survival. Similarly, Taylor (2013) found that SMEs managers with high entrepreneurial behavior are more likely to achieve higher performance and growth irrespective of the business environment in which they operate. McGrath and McMillian (2000) and Keh, Nguyen, and Ng (2007) also reported that Entrepreneurial Attitude gives an organization competitive advantage in an existing or new market because it enable them to always discover, create, and exploit opportunities regularly, well ahead of their competitors. According to (Dhiwayo and Vuuren, 2007) Entrepreneurial attitude relates to a set of personal or behavioral traits, values, perception, attitude, a pattern of thinking about business opportunity

that is associated with innovation and creativity with a view to capture the benefits of uncertainty.

On the other hand, managers have responsibility to carry-out managerial functions of strategizing and obtaining the necessary inputs which is put together to successfully execute operation. Organizational survival is defined through financial and non-financial elements such as profitability, return on investment, products and services quality, owners satisfaction's, customer's satisfaction, employee's satisfaction etc. (Simpson et al.,2007). Organizational survival is concerned with organizations members pulling their efforts towards achieving organizational goals which has so many potential benefits, including the following: economic of scale, increase profitability, sales increment and Adaptability, hiring the best employees, increase prestige and employee satisfaction etc. Thus in order to ensure organizational survival, entrepreneurial attitude must be incorporated into the operation of the firms.

Over the past decade, much has been written about entrepreneurial attitude and organizational survival. Despite the increase in prior publications and studies, the extent to which entrepreneurial behaviors influence organizational survival has not been sufficiently clarified (Zahra and Covin, 1995). Similarly, most of the studies in the entrepreneurship literature tend to focus in SMEs in America and other developed countries with very little studies in respect to developing countries such as Nigeria. Furthermore, previous studies focused on established corporate

organizations and medium-large organizations, leaving out SMEs which is considered to be a very powerful means of national development. To bridge this existing gap in literature, this study examines the relationship between the dimensions of Entrepreneurial Attitude and the measures of organizational survival.

Statement of the Problem

Small and Medium Enterprise (SMEs) have continued to be recognized as the bedrock and powerful engines room for any nation's growth and development of most economies of the world (Ariyo, 2008). Conversely, the SMEs sub-sector has continued to face various challenges that have militated against their success. The dynamic nature of the SMEs sub-sector makes it vulnerable to high mortality rate cause by high uncertainty and competitiveness in the environment. However, prior studies revealed that over the past decades, the Government of Nigeria has made many efforts in boosting this sector. It has established an institutional framework consisting of industry support agencies, formulations of supporting policies and assistance from financial institutions. These had led to the creation of Small and Medium Enterprises Development Agency (SMEDAN),National Enterprises Development Programme (NEDEP), Micro, Small and Medium Enterprises (MSMEs) national and state council, funding access from the central bank and development banks: such as(Commercial Banks, Micro-Finance Bank and Industrial Bank).

In the perspective of Ayyagari et al (2003), Small and Medium Enterprise (SMEs) make-up the vast majority of firms that operate in Nigeria, they represent about 90 percent of the industrial sector as regards number of enterprises. However, they contribute only 1% (percent) of the Gross Domestic Products (GDP). This is a far cry from other nations such as Indonesia, Thailand and India where their SMEs are vibrant and has contributed about 40% (percent). Besides the poor performance of the SMEs, they are increasingly experiencing high birth rate and mortality rate among the different type of firms operating in Nigeria. Most SMEs in Nigeria die within the duration of their first and fifth year of existence, representing ninety five percent (95%); while only about five to ten percent (5-10%) is quoted to have succeeded. A survey conducted by Small and medium Enterprises Development Agency of Nigeria (SMEDEN) in collaboration with National Bureau of Statistic (NBS) in 2013 affirmed this assertion.

Lyon et al., (2000) and Nowduri et al., (2002) assert that SMEs facilitate easy distribution of economic wealth and the decentralization of economic growth. Conversely, despite the contributions of these SMEs to national development they are responsible for most of the breakthroughs and advances in new products and process. They contribute to the alleviation of poverty through employment creation, equitable distribution of wealth, provision of flexible and specialized service to large scale industries, stimulation of economic development and national growth by participating mostly in the untapped markets. However, SMEs and their impacts have been less satisfactory and their performances have fallen short of

expectation particularly in the developing economies of the world (Manbula, 2002).

According to Okpara, (2000); Fatoki and Odeyemi (2010) SMEs in the developing countries, faces two major challenges: Internal factor such as lack of entrepreneurial competencies, management skill, commitment, resources, strategies choice and External factors including competitors, culture, technology, infrastructure, policies inconsistencies in Government and official bureaucracy. In providing answers to these challenges, Mcgrath and McMillian, (2002), are of the opinion that organization using conventional strategies are over-run and out-run by entrepreneurial competitors because tools, training and business models that worked for businesses before are no longer yielding positive results again. Therefore, it is needful for entrepreneurial organizations and managers to think outside of the box, by being non-conventional in their thinking process, identifying new business opportunities and adapt to the change and uncertainty in the business environment. Also, the Nigerian Government should begin to give more importance to SMEs development and formulations of policies that create a more favorable atmosphere for the establishment and operations of these SMEs. The study specifically examined the relationship between Entrepreneurial Attitude and organizational survival in selected SMEs in Rivers State.

Objective of the Study

1. To investigate the relationship between innovativeness and organizational survival in selected SMEs in Rivers State.
2. To examine the relationship between the propensity for risk taking and organizational survival in selected SMEs in Rivers State.
3. To investigate the relationship between pro-activeness on organizational survival in selected SMEs in Rivers State.

Research Hypotheses

In pursuance of the research objectives the following hypotheses will be relevant to this study. They include:

Ho_1: There is no significant relationship between innovativeness and customer satisfaction of SMEs in Rivers State.

Ho_2: There is no significant relationship between innovativeness and adaptability of SMEs in Rivers State.

Ho_3: There is no significant relationship between pro-activeness and customer satisfaction of SMEs in Rivers State.

Ho_4: There is no significant relationship between pro-activeness and adaptability of SMEs in Rivers State.

Ho_5: There is no significant relationship between risk taking and customer satisfaction of SMEs in Rivers State.

Ho_6: There is no significant relationship between risk taking and adaptability of SMEs in Rivers State

2. Review of related literature

2.1 Theoretical framework

Entrepreneurship theories remain important to the development of the entrepreneurship study. Today, the field of entrepreneurship has so many interesting and relevant theories that will be of insight to the study of entrepreneurship. These theories includes: The self-theories of intelligence, the innovative system theories, the psychological entrepreneurial theory of competency and the theory of the market process base on the concept of entrepreneurial alertness. This study intends to examine entrepreneurial attitude as an element in the entrepreneurial process of an organization. Therefore theoretical understanding can be gained by adopting two of these theoretical developments such as the psychological entrepreneurial theory of competency and the theory of entrepreneurial alertness which was made popular by Kirzner (1989). The psychological entrepreneurial theory of competency was first popularized by Richard Boyatzis. This theory focused on the personality traits of the individual entrepreneur and the characteristics associated with entrepreneurial behavior. It considered the entrepreneur as an individual with unique personality traits: value system, attitudinal, managerial abilities, technical competencies and needs which distinguished the entrepreneur from the non-entrepreneur, (Landstorm, 2005). Korunka et al (2003) argued that personality traits as a theory of entrepreneurship is analyzed from the individual level of organization which is centered prominently on the characteristics associated with entrepreneurial personality: internal control, risk-taking, innovativeness, proactive-ness, need for achievement and tolerance for

ambiguity. Lachman (1980) argued that the possession of these traits in an entrepreneur will result into higher propensity for organizational survival. In the view of Onstenk (2003) and Kiggundy (2002), they describe entrepreneurial competency as the necessary capacity and ability of the entrepreneur to perform entrepreneurial activities such as altitude, knowledge, skill, expertise and mindset. Jackson (1976) studied the significance of personality theory and reckons that personality trait are relatively enduring pattern of behavior or cognition that differentiates people. He further argued that innovation as an entrepreneurial trait exists alongside other personality traits such as conformity, risk-taking, and openness to experience etc. He described openness as people's response to change and their willingness to adjust or adapt in accordance with the new ideas or situations. On the other hand, Bird (1995) argued that entrepreneurial psychological traits are not inborn; he averred that these traits can also be nurtured through experience in the specific industry sector, training and learning.

The other theory that can be considered an insightful in the entrepreneurship literature is the theory of entrepreneurial alertness which was made popular by Kirzner (1989) after building on the works of Ludwig von Mises. This theory is a discovery process that emphasize on the identification, discovery, and exploitations of opportunities by the entrepreneur, by being constantly alert to the environment (Kirzner, 1989). Shane and Venkataraman, (2000) affirming Kirzner's assertion, posit that alerted managers are on the lookout for imperfect market where they constantly scan the environment for unnoticed imperfection and unspotted market

that they may introduce new products and service. This concept accommodates the pro-activeness of manager (i.e. orientation towards the future)

2.2 Concept of Entrepreneurial attitude

Entrepreneurial attitude refers to the set of personal psychological traits, values, attributes, attitudes and behaviors that determine how an individual or organization interprets and reacts to an entrepreneurial circumstances or situations (Covin and Slevin, 1986). In order words, it is a state of mind that predicts the response of an individual or organization in a consistently favorable or unfavorable manner in respect of an entrepreneurial circumstance, change or uncertainty (Schwarz et al, 2009). Antonic and Hisrich (2001), defined entrepreneurial attitude as the ability and willingness of individual or organization to quickly discover, made preparations in response to a judgmental decision under uncertainty about a possible exploitation of business opportunities. According to Dyhiwoyo and Vuuren, (2007) entrepreneurial attitude is about the ability to search and capture business opportunities by being creative, innovative, pro-active and risk-taking which results to wealth generation and organizational survival. In order words, it is a way of thinking and an approach to business opportunities and the willingness to capture the benefits of uncertainty. However, some individual and organizations are more entrepreneurially than others (McGrath and McMillian, 2000; Damanpour, 1991). They agreed that those who exhibited entrepreneurial behaviors from the individual level of analysis have more entrepreneurial mind-set than conservative business owners; while investigations also proved that those

organizations that act more entrepreneurially have entrepreneurial culture (Covin and Slevin, 1991).

2.3 The Concept of Organizational Survival

Maheshwari (1980) argued that the concept of Organizational survival is a multiple dimensional concept with no common definition, making it elusive that there is no one single way of defining organizational survival. This fact may be due to the many criteria used to measure organizational survival and the many definitions available for the concept. He further defined success as the ability of an organization to achieve an acceptable outputs and expectations which are in line with the organizational goals and objectives. Evidence found in the entrepreneurial, management and business literatures confirmed that organizational survival and organizational performance are very narrowly connected (Perren, 2000; Jennings and Beaver, 1993). Also, according to De-Smet and Schanninger (2006) success can be defined as an organizational ability to operate effectively and efficiently, coping adequately and being able to withstand the environmental turbulences by being flexible and adapting to change which may result to growth. Imoisili (1978) defined Organizational survival as organization's ability to achieve sustainable growth and realization of its goals which leads to eventual superior performance. Similarly, Jenning and Beaver (1995) are of the view that the most commonly adopted description of organizational survival has much to do with financial viability and growth with sufficient profits than other factors such as owner's satisfaction, employee satisfaction etc. Simpson et al., (2007) maintained that

organizational survival is a multi-dimensional concept which has no single significant element as its measures of analysis. Simpson et al., (2004) noted that there are two major indicators of success: the financial and non-financial measures. The financial performance measures of organizational survival includes: profitability, returns on capital, productivity of assets, sales margins, net operating margin etc. while the non-financial indicators are the degree of employee satisfaction, ability to retain management talent , the degree of customer satisfaction, owners' satisfaction, superior products and services etc. On the other hand, determination of the right criteria is paramount in getting the accurate result. According to Masuo (2001) to avoid errors in determining the measures, the selections of appropriate measure should depend on the type or nature of the organization under review, the various environmental factors, cultures, management styles, capital availability, technology and goal of the organization should be considered. This argument is based on the fact that every organization has its different characteristics, goals and constituencies. Paige and Littrell (2002) assert that some scholars includes subjective (intrinsic) criteria such as freedom and independence, being one's own boss, controlling one's own future; while the objective (extrinsic) factors such as increase profitability and wealth as the criteria for organizational survival. Cameron (1979) suggested that there are other criteria that could be used in the measurement of organizational survival such as effectiveness and efficiency. Organizational survival will be defined as the ability of a firm to realize and actualize its outcome and expectations in line with its mission, goals and objectives

2.4 Relationship between Entrepreneurial Attitude and Organizational Survival

Previous researchers assert that entrepreneurial actions are considered strategic factor to competitive advantage and improved performance in an organization, irrespective of the type, size, age and location of the organization (Zahra and Covin, 1995; Wiklund, 2005; Lumpkin and Dess, 1996; Zahra, 1991). According to Dhliwayo and Vuuren (2007), entrepreneurial orientation tends to generate innovativeness by creating new resources or carrying out new combination which leads to new products and new markets that can improve organizational profitability and success. Also, Zahra and Covin, (1995) assert that entrepreneurial mind-set enable organization to champion new initiative in an established organization which is made possible by creating an innovative culture that carrying out research and development which is focused on idea development. This can enable the organization to have the first mover advantage which result to positive competitive advantage in the organization.

Entrepreneurial oriented organization and members are constantly alert to opportunity in the ever rapid changing business environment by scanning and searching for information that help managers to make informed decision about new products ideas, new market and new method of production which leads to greater profitability and organizational survival. Lumpkin and Dess (1996) assert that entrepreneurial mind-set enables organization to exhibit entrepreneurial characteristic such as innovativeness, risk taking, autonomy, proactive-ness, and

tolerance for failure. These measures are the key features of successful organizations.

3. RESEARCH METHODOLOGY

The study adopted a cross-sectional survey of the quasi-experimental design. This method is adopted because the respondents who are in their private business are exposed to complex relationships which are not subject to manipulation (Baridam, 2001). This study aimed at examining the relationship between of Entrepreneurial attitude and survival in SMEs in Rivers State. The population for this study comprises of all the Small and Medium Scale Enterprises in Rivers State, registered with the Rivers State Ministry of Trade and commerce. However, for easy accessibility, the accessible population consists of 100 respondents, (owners-partners, managers and key officers) from the 20 selected SMEs within Rivers State, using purposive sampling technique. The sampling procedure adopted in this study is the Simple random sampling technique. This approach is to enable each member of the population to have an equal chance of being selected. It was from the accessible population that the sample size for the study was drawn. A sample size of eighty (80) owners-partners, managers and key officers was drawn from the twenty (20) selected SMEs under review. The sample size was determined using Taro Yamene formula (Baridam, 2008). Data was collected through questionnaire. It is assumed that responses obtained from the sample respondents would be representative of the opinions of all SMEs operating in Rivers State. The respondents are in position to express their opinion about the questions relating to

the research instrument. The entrepreneurial attitude (Independent Variable) was measured in terms of innovativeness, proactive-ness and risk-taking. Five items each were used in measuring the variables on the 5 point Likert scale of measurement: where 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree and 1 = Strongly Disagree. The questionnaire was adapted from the various 22 items of entrepreneurial orientation scale of Covin and Slevin (1989).

The dependent variable: (Organizational survival) was measured with Adaptability and customer satisfaction. Five items each were used in measuring the variable on the 5 point Likert scale of measurement: were 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree and 1 = Strongly Disagree. The questionnaire was adapted from the various items of Organization Success Scale (OSS) developed by (Simon et al., 2011). The measurement instrument was subjected to Cronbach Alpha test of reliability which gave a high reliability alpha of above 0.7. According to Nunnally, (1978) an alpha output of 0.7 and above ensure internal consistency and reliability. The following Cronbach Alpha were obtained: Innovativeness (93) Pro-activeness(93) Risk-taking(94) Customer Satisfaction(92) Adaptability(95). To empirically evaluate the relationship between entrepreneurial attitude and the organizational survival, the Spearman's rank order correlation coefficient (Rho) was employed.

4. RESULTS AND DISCUSSION

4.1 Respondents Demography

The population for the study targeted all 120 managers and employees of the sample institutions in Rivers state. After the cleaning process, only 80 copies of questionnaire were considered useful and valid for inclusion in the study. There were 66 males and 14 females. 51 Respondents constituting 65.9% of total respondents were Married, while 29 (34.1%) respondents were single.

4.2 Test of Hypotheses

Hypothesis One

Ho_1: There is no significant relationship between innovativeness and customer satisfaction of SMEs in Rivers State.

Journal of Asia Entrepreneurship and Sustainability

Table 4.1 Correlation Output of innovativeness and customer satisfaction of SMEs in Rivers State.

Correlations

			INNOVATIVENESS	CUSTOMER SATISFACTION
Spearman's rho	INNOVATIVENESS	Correlation Coefficient	1.000	.983**
		Sig. (2-tailed)	.	.000
		N	80	80
	CUSTOMER SATISFACTION	Correlation Coefficient	.983**	1.000
		Sig. (2-tailed)	.000	.
		N	80	80

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Statistical Package for Social Sciences (version 22) Extract.

Table 4.1 above illustrates the analysis for the association between innovativeness and customer satisfaction of SMEs in Rivers State. Where rho = .983 and p = 0.000. The findings shows a very positive and significant association between both variables (where ** depicts a significance at 0.01 and $p < 0.05$); so based on the

criterion for null hypothetical statement rejection of $p < 0.05$, we reject the null and restate that there is a significant relationship between innovativeness and customer satisfaction of SMEs in Rivers State.

Hypothesis Two

Ho_2: There is no significant relationship between innovativeness and Adaptability of SMEs in Rivers State.

Table 4.2 Correlation Output of innovativeness and Adaptability of SMEs in Rivers State.

Correlations

			INNOVATIVENESS	ADAPTABILITY
Spearman's rho	INNOVATIVENESS	Correlation Coefficient	1.000	.975**
		Sig. (2-tailed)	.	.000
		N	80	80
	ADAPTABILITY	Correlation Coefficient	.975**	1.000
		Sig. (2-tailed)	.000	.
		N	80	80

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Statistical Package for Social Sciences (version 22) Extract.

Table 4.2 above illustrates the analysis for the association between innovativeness and Adaptability of SMEs in Rivers State. Where rho = .975 and p = 0.000. The findings shows a very positive and significant association between both variables (where ** implies significance at 0.01 and $p < 0.05$); therefore based on the criterion for null hypothetical statement rejection of $p < 0.05$, we reject the null and restate that there is a significant relationship between innovativeness and Adaptability of SMEs in Rivers State.

Hypothesis Three

Ho_3: There is no significant relationship between pro-activeness and customer satisfaction of SMEs in Rivers State.

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Table 4.3 Correlation Output of pro-activeness and customer satisfaction of SMEs in Rivers State.

Correlations

			PRO-ACTIVENESS	CUSTOMER SATISFACTION
Spearman's rho	PRO-ACTIVENESS	Correlation Coefficient	1.000	.992**
		Sig. (2-tailed)	.	.000
		N	80	80
	CUSTOMER SATISFACTION	Correlation Coefficient	.992**	1.000
		Sig. (2-tailed)	.000	.
		N	80	80

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Statistical Package for Social Sciences (version 22) Extract.

Table 4.3 above illustrates the analysis for the association between pro-activeness and customer satisfaction of SMEs in Rivers State. Where rho = .992 and p = 0.000. The findings shows a very positive and significant association between both variables (where ** implies significance at 0.01 and $p < 0.05$); therefore based on

the criterion for null hypothetical statement rejection of $p < 0.05$, we reject the null and restate that there is a significant relationship between pro-activeness and customer satisfaction of SMEs in Rivers State.

Hypothesis Four

Ho_4: There is no significant relationship between pro-activeness and Adaptability of SMEs in Rivers State.

Table 4.4 Correlation Output of pro-activeness and Adaptability of SMEs in Rivers State.

Correlations

			PRO-ACTIVENESS	ADAPTABILITY
Spearman's rho	PRO-ACTIVENESS	Correlation Coefficient	1.000	.972**
		Sig. (2-tailed)	.	.000
		N	80	80
	ADAPTABILITY	Correlation Coefficient	.972**	1.000
		Sig. (2-tailed)	.000	.
		N	80	80

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Statistical Package for Social Sciences (version 22) Extract.

Table 4.6 above illustrates the analysis for the association between pro-activeness and Adaptability of SMEs in Rivers State. Where rho = .972 and p = 0.000. The findings shows a very positive and significant association between both variables (where ** implies significance at 0.01 and $p < 0.05$); therefore based on the criterion for null hypothetical statement rejection of $p < 0.05$, we reject the null and restate that there is a significant relationship between pro-activeness and Adaptability of SMEs in Rivers State.

Hypothesis Five

Ho_5: There is no significant relationship between risk taking and customer satisfaction of SMEs in Rivers State.

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Table 4.5. Correlation Output of risk taking and customer satisfaction of SMEs in Rivers State.

Correlations

			RISK-TAKING	CUSTOMER SATISFACTION
Spearman's rho	RISK-TAKING	Correlation Coefficient	1.000	.786**
		Sig. (2-tailed)	.	.000
		N	80	80
	CUSTOMER SATISFACTION	Correlation Coefficient	.786**	1.000
		Sig. (2-tailed)	.000	.
		N	80	80

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Statistical Package for Social Sciences (version 22) Extract.

Table 4.5 above illustrates the analysis for the association between Risk taking and customer satisfaction of SMEs in Rivers State. Where rho = .786 and p = 0.000. The findings shows a very positive and significant association between both variables (where ** implies significance at 0.01 and $p < 0.05$); therefore based on the criterion for null hypothetical statement rejection of $p < 0.05$, we reject the null

and restate that there is a significant relationship Risk taking and customer satisfaction of SMEs in Rivers State.

Hypothesis Six

Ho6: There is no significant relationship between risk taking and Adaptability of SMEs in Rivers State.

Table 4.6. Correlation Output of risk taking and Adaptability of SMEs in Rivers State.

Correlations

			RISK-TAKING	ADAPTABILITY
Spearman's rho	RISK-TAKING	Correlation Coefficient	1.000	.727**
		Sig. (2-tailed)	.	.000
		N	80	80
	ADAPTABILITY	Correlation Coefficient	.727**	1.000
		Sig. (2-tailed)	.000	.
		N	80	80

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Statistical Package for Social Sciences (version 22) Extract.

Table 4.6 above illustrates the analysis for the association between Risk taking and Adaptability of SMEs in Rivers State. Where rho = .727 and p = 0.000. The findings shows a very positive and significant association between both variables (where ** implies significance at 0.01 and $p < 0.05$); therefore based on the criterion for null hypothetical statement rejection of $p < 0.05$, we reject the null and restate that there is a significant relationship Risk taking and Adaptability of SMEs in Rivers State.

DISCUSSION OF FINDINGS

Our findings revealed a strong and significant relationship between the dimensions of entrepreneurial attitude (risk taking, pro-activeness and innovativeness) and the measures of organizational survival (adaptability and customer satisfaction) this is in agreement to the works of (Muhammed et al. 2015) who argued that the entrepreneurs who are more optimistic (those he referred to as risk takers) will have a better chance at the survival of their businesses than those who are pessimistic. Our finding that there is a strong relationship between Pro-activeness and the survival of small and medium scale enterprises is in support of the view of Hughes and Morgan, (2007) who argue that pro-activeness as a strategy enables organizations to achieve business success as it makes them confidently seek for opportunities where they introduce new products, services or market ahead of other competitors and act in anticipation of future change in demand and emerging uncertainty in the firm's internal and external environment. Our findings completely related innovativeness to survival of entrepreneurs as earlier agreed by

(Chononye et. al., 2016) who suggested that passion for innovation was key to the success of new businesses and entrepreneurship. A sentiment also shared by Parimala & Ilham (2016) who also revealed a strong and significant relationship between innovativeness, risk taking and customer satisfaction and adaptability.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary: This study evaluated the interrelationship between entrepreneurial attitude and organizational survival by taking a cross-sectional analysis at the interplay between three dimensions of Entrepreneurial attitude which includes innovativeness, Pro-activeness and risk-taking and measures of Organizational survival which entails Adaptability and customer satisfaction using a sample of twenty firms and primary data. A strong and significant relationship was found to exist between the variables.

Conclusion: This paper concludes by fully agreeing with Ebiringa (2011) and Adegbite et al (2006) who asserted that entrepreneurial mind-set and operations might be complacent but significant and proportionately predicts the organizational performance and success level of a firm.

Recommendations: In light of the above, the study recommends that:

- Due to the complacent level in risk taking and innovativeness as discovered in the study, it will be necessary that firms be given proper finance by banks to enable them undertake more innovative and enterprising activities.
- Government ought to as matter of criticality help planned business visionaries to have admittance to the public purse to back them up and also provide

fundamental data identifying business opportunities, present day innovation, available crude materials and business sector.

- Government should provide enabling environment especially the necessary infrastructure that will significantly reduce the cost of doing business..

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Measuring Entrepreneurial outcomes from a Residential Enterprise School for Postgraduate Researchers

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Abstract

This paper describes the measurement of entrepreneurial outcomes from a four day residential Enterprise School for Ph.D. and postdoctoral researchers from a mix of subject areas held in North West England. We determine the effectiveness of the programme in terms of encouraging a range of entrepreneurial behaviours from increased confidence to start a business to the actual creation of a business, and also intermediate outcomes such as using their new skills when returning to the workplace. Using a questionnaire at the end of the course and then eight months later, we have tried to fit the outcomes to the Rugby Team Framework as a model to measure the impact of the school in terms of what elements of the course they had incorporated in their workplace. We found that most students after returning still said they were more likely to start a business, a small number had actually started a business but interestingly we found that many were using the skills they

learned now in the workplace, for example, opportunity spotting. These intermediate outcomes are often neglected by other studies but could prove valuable for employers and from those employees with them leading to higher employability and faster promotions.

Introduction

Entrepreneurship training and development for researchers is a much debated topic with many examples of programmes worldwide and the measurement of successful outcomes has been determined in a variety of ways. Most measurement focus on self efficacy of attendees and longitudinal studies examining the number of business start-ups created. Universities in the UK (McKeown *et al*., 2006, Smith *et al*., 2006) and worldwide (e.g. European Commission Report, 2015, Kuratko, 2005, Katz, 2003) have initiated a variety of programmes in order to stimulate enterprise within undergraduate and masters courses and also options such as MBAs specializing in entrepreneurship, technology transfer and other entrepreneurship masters courses (Greene and Rice, 2007, Gibb *et al*., 2013, Gartner and Vesper, 1994, Pittaway and Cope, 2007). However, enterprise training specifically for those undertaking research degrees and research staff such as postdoctoral fellows whilst increasing, is more limited with fewer examples (Williams *et al*., 2013, Phillips, 2010). This, however, is an important area since these researchers may find themselves with an opportunity to commercialize research via a spin-out venture or by licensing intellectual property to industry if they work in academia or by

spotting opportunities for commercial success if they gain employment in industry. A very low proportion of graduates start a business on graduation (e.g. Luthje and Franke, 2003), with many future entrepreneurs gaining employment on graduation and working for a number of years first gaining experience before starting a venture in their area of interest. This makes assessing the effectiveness of entrepreneurship training in terms of venture creation more difficult. Some longitudinal studies have been done to measure venture creation by graduates over a longer time period of many years (Matlay and Carey, 2007) but such long term studies make quick assessments of training activities difficult. Many initiatives in enterprise education involve attempting to change mindsets of people and equip them with the skills to be more enterprising in later life and speedier assessments as to success of courses are made by measuring improvement in self efficacy of those attending.

Researchers have tried to understand how to best measure the impact (for example, Vesper and Gartner, 1994, Fayolle et al., 2006) and have found mixed results when analysing the effects of a range of entrepreneurship training or education activities. For example, Fayolle and Gailly (2015) found little change in entrepreneurial intention in students attending a three-day course, however they did ascertain that the previous background of the students was a factor in how susceptible they were to training. Sometimes intention to start a business reduces as students realise it is more difficult than they initially thought (Fayolle and Gailly, 2015). Cooper and

Lucas (2006) have attempted to measure self efficacy with a multi-day training course and found that an increase in confidence was measured 6 months post course, but entrepreneurial intention was increased to a much lesser extent. Peterman and Kennedy (2003) also looked empirically at a training programme and showed that perceptions of both the desirability and feasibility of starting a business are strongly influenced by the program. In particular, the results of the study show that people who had low positiveness of entrepreneurial experience before the program recorded significant changes in their perceptions towards starting a business after participating in the enterprise program. However, Oosterbeek et al. (2010) found the particular program they studied did not have the intended effects with self-assessed entrepreneurial skills benefit insignificant and the effect on the intention to become an entrepreneur is even significantly negative. They also suggested the negative impact of the program on the intention to become an entrepreneur could be due to a more realistic view of what is needed to start an own business or participants might have lost some of their overoptimistic attitude and this may have caused a lower interest in entrepreneurship. There is also of course the possibility that the program participants may simply have disliked the program and some authors have reported a difference when using different teaching styles. Souitaris et al. (2007) showed that in their program studied the programmes raise some attitudes and the overall entrepreneurial intention and students are often inspired by the programmes, but enthusiasm can fade as time passes. More recently a meta-analysis study by Martin et al. (2013) found overall there was evidence to support that entrepreneurship training was effective. They

also suggested that the variation in how material was presented – for example whether experiential or hands on, could have an effect as well as the teaching style of the lecturer presenting the course. In addition, a European Commission Report (2015) examined evidence from 91 studies from 23 different countries and concluded that overall enterprise education does work in terms of creating start-ups, which tend to be more successful when started by those with enterprise education experience. Those that have attended training also are less likely to be unemployed and also tend to earn more. Evidence also suggests there is a cumulative effect of training, with those attending more activities having a greater positive effect. Measuring success is a topic for debate and many authors have different views, as discussed above, venture creation is obviously such a measure, as is changing culture (Cooper and Lucas, 2006, Tomes 2003, Pittaway and Hannon, 2008) and an enterprising individual is likely to be successful at whatever career path they chose. Many would argue it is the role of this type of course to improve self efficacy (Bandura, 1997) so if they have a commercialisable idea they will have the confidence and know how to attempt to start a business in the future or use their skills in a larger organisation, so we expect the skills developed during such a course would be useful in many different careers. Researchers may work for a larger company where they will need to come up with new ideas and test their feasibility or may work in academia and create a spin out company later, such activities now becoming more important for academic promotions and for grant applications in terms of showing impact. They may work in an SME where their roles might involve marketing, liaising with customers, technical support as well as

research and there is also an increasing interest in social entrepreneurship amongst postgraduates of all subject areas, we have also found anecdotally. It has become increasingly important that Ph.D. graduates have transferable entrepreneurial skills as the lack of opportunities in academia for researchers means many will need to find employment in commercial or not for profit sectors (where employers will require more than simply knowledge of a niche area) or to start their own business.

The Enterprise School and rationale

There are several key drivers which have shaped enterprise training for postgraduates at the University. Beginning with Gareth Roberts' *SET for success* report (2002) and further shaped by a number of subsequent reports such as The Leitch Review (2006) of skills which argued that the UK must urgently raise achievements at all levels of skills and recommends that it commit to becoming a world leader in skills by 2020; the BIS report (2010) *One Step Beyond; Making the most of postgraduate education* states "We know that postgraduates are important drivers of innovation, entrepreneurship and growth and that many employers value postgraduate level skills. However, HEIs and businesses could do more to work together to ensure postgraduates have the business-facing skills that employers need." The Wilson review (2012) also emphasises the need for commercially aware graduates. Since the Roberts SET for success report (Roberts 2002) and the subsequent funding in this area, an increasing amount of transferable skills training has been offered to Ph.D. students and postdocs including in some cases enterprise,

and those skills useful to the entrepreneur such as finance, networking, marketing and IP awareness. Many students exposure to entrepreneurship may be ad-hoc e.g. talks from the technology transfer office or attending workshops or talks by guest speakers on a voluntary basis. The enterprise school was one of a number of enterprise training activities which came out of an investigation of secondary data such as government reports and by conducting surveys and focus groups of researchers and is detailed in a previous paper (Phillips, 2010). The enterprise school allowed a more structured program for a number of people interested in entrepreneurship during an intensive four days. The Enterprise School consisted of an over-arching theme of creating a business idea suitable for the local environment and completing a feasibility study before presenting this as a pitch to a panel of judges. Entrepreneurship is suited to learning by experience (e.g. Rae and Carswell, 2000, amongst others), so as far as possible learning was of a practical nature. The students were introduced to a variety of skills during the course such as opportunity recognition, market research, intellectual property, finance and sessions were of a practical nature. In addition, transferable skills such as team building, presentation and research skills were included. Students used the local area (The Lake District in North West England) as an inspiration for ideas and a source of problems and it also allowed them to conduct primary market research with local people and businesses. The key element to the school is that it worked on real ideas created in response to genuine problems to ensure that students had buy-in rather than work on a theoretical problem or one set by another organisation. Students were able to self-select ideas they wanted to work on with

groups to encourage greater buy-in. Each group had access to the internet and databases for information for their idea e.g. for secondary market research information. Students were required to complete a personal journal similar to that of Phillips (2008) as a way of learning from their experience and to be able to take away a record of what they had achieved. Journals have been used to good effect by a number of subject areas including business and entrepreneurship (Jack and Anderson, 1999, Friesner and Palmer, 2009). Broadly, the aim was to cover the skills needed to turn an idea into a business, to practice these skills and also address the need to improve transferable skills which many authors agree is necessary to be a successful entrepreneur. In addition, it was hoped that attendance at the Enterprise School would become inspired by the staff, guest entrepreneurs and from their like-minded peers.

We aimed to measure a range of outcomes such as increased motivation to start a business, to higher level outcomes such as actually starting their own venture. We also attempted to measure intermediate level outcomes such as increased awareness of opportunities and use of their new skills learned at the enterprise school when they returned to their research environment.

We have used the Rugby Team Framework (The Rugby Team Impact Framework, 2008) summarised below as a basis for measuring the effectiveness of training (itself based on Kirkpatrick and Kirkpatrick, 2006) which could be applied in this case with a scale running from students simply being happy with their experience

to behavioural changes and real outputs in terms of venture creation. This paper attempts to link potential outcomes to this framework.

Impact Level	Description of Qualifying Activity
0 (Foundation)	The development of infrastructure for training and development is response to an identified need e.g. the setting up of a programme of training or installing facilities. Effectiveness is measured by numbers attending (throughput).
1 (Reaction)	Reaction of attendees to training e.g. Do they view the experience positively and think the training will be useful to them in the future, measured using a simple questionnaire.
2 (Learning)	Improvement in knowledge or attitude change as a result of training incorporated into work life e.g. ability to spot opportunities once back in the workplace.
3 (Behavioural)	A change in behaviour as a result of training which has increased their effectiveness at work, from use of their new skills.
4 (Outcomes)	Have changes in behaviour resulted in a clear measurable outcome e.g. started a business.

This paper will detail our findings from initial and follow up surveys of those who have attended the enterprise school and will be of interest to those planning entrepreneurship training and those who are interested in the views of current generation of researchers who may create innovative research led companies. The

key difference in this work is that we are measuring not just self efficacy and venture creation but whether the students were using their new skills and spotting potential opportunities when back in their research environments which would create value for the employing organisation.

Methodology

In measuring the impact of the training using the Rugby Team model, the foundation level was assumed to have been satisfied by putting together a programme of enterprise training based on focus groups and surveys to identify needs as well as measuring high numbers of people attending events previously (Phillips, 2010). The Enterprise School itself was heavily oversubscribed. In terms of measuring the outcomes due the subsequent diverse geographical spread on completion of the course with some students having jobs elsewhere it was decided that a quantitative study using questionnaires was likely to be the most effective method for this study.

Two surveys were carried out. Firstly, on completion of the course a simple survey was completed to determine the immediate reaction of participants to the training, enquiring whether participants thought the training would be useful to them. We suggest this is a level 1 outcome (reaction) to the training provided. This gave us an indication of the gut feel of students as to whether the course was going to have an impact on their work and attitude and whether they though it was going to be

useful to them. At this point we also asked about career intentions, perceived barriers to starting a business and motivations for starting a business.

However, the intention was to look at more than just whether they intended to start a business but whether they thought they would be more enterprising when returning to their Ph.D. or research position using any of their new skills on returning to their research position. So secondly, a questionnaire was completed by attendees eight months after returning from the enterprise school. This questionnaire allowed respondents to select a response but also to add extra information to allow their exact circumstances to be described appropriately. This questionnaire attempted to measure whether attendees were actually using any of the skills in their research positions or jobs and indeed whether they had started their own business. The responses were linked to level 3 and 4 outcomes i.e. 3 being a change in the way they were working as a result of their new skills and 4 being tangible outcomes in terms of actually starting a business.

The sample size was 53 students and postdocs attending the Manchester Enterprise School in July 2012 and 2013 who were surveyed on completion of the enterprise school and 17 respondents who replied to the eight month survey. In terms of limitations, this was a self selecting group who had responded to our advertisement for those interested in enterprise and had satisfied us of their interest by a written explanation of why they wanted to attend and also a lower response rate for the second questionnaire is clearly a limiting factor.

Journal of Asia Entrepreneurship and Sustainability

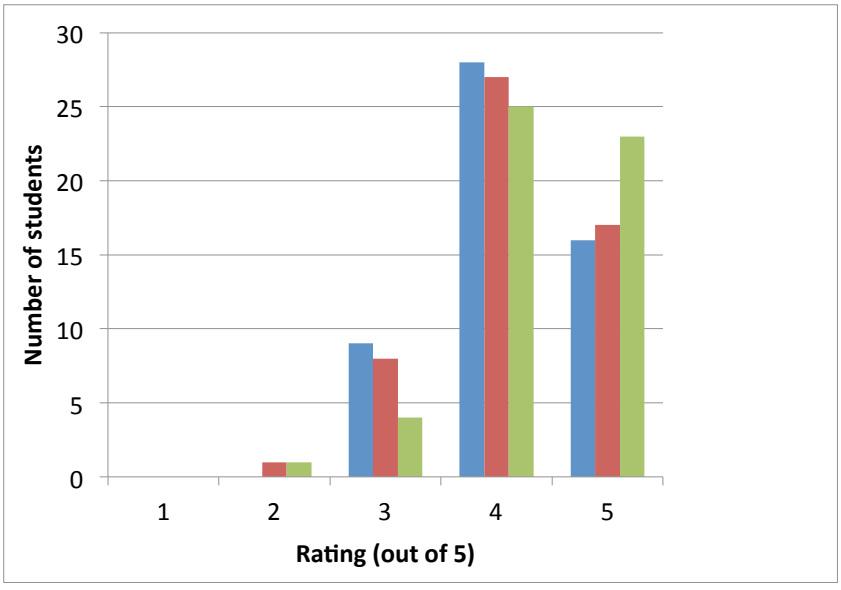
Results

The results from the two questionnaires are as follows;

Questionnaire One (on completion of course)

The first questionnaire is summarised in Figure 1; the initial reaction of participants from the 53 respondents was that the school was enjoyable and most felt that it would be useful. It appeared to be a positive experience for most.

Figure 1: Responses from students to rating the Enterprise School in terms of content, usefulness and how enjoyable (53 responses in total)



Where 1 = poor and 5 = excellent

Blue = Content, Red = Usefulness, Green = Enjoyable

Means for each: Content (4.132), Usefulness (4.113), Enjoyable (4.302)

However, an enjoyable experience does not necessarily mean any of the learning will be used in the future. This could simply be the positive reaction to an enjoyable week, however, some specific comments on what they thought they learned included;

- Gained a better understanding of factors to consider for business (solutions to problems, market research, finance, IP etc) and how to manage these as a team
- Gained some transferable skills
- Now have a good idea about business (currently have no management and business background), so it was great to gain some skills
- Gained people skills – presentation skills and communication skills
- Gained skills working in teams with people from different backgrounds
- I learnt my strengths and weaknesses in a team setting
- I leaned a lot about team work and working under pressure

It is reasonable from the above feedback and responses to assume that a level 1 impact was achieved from students attending the Enterprise School.

Also in the first questionnaire, the students were asked about whether the immediate aftermath of the course was likely to induce any attitude change in order to gauge Level 2 impacts. This level reflects the extent to which participants change attitudes, improve knowledge, and/or increase their skills as a result of attending training. There were 45 responses to this part of the questionnaire

Question 1: Are you more likely to start a business having participated in the Enterprise School?

Yes	No	The same
29	0	16

Promisingly, on completion, 29 of 45 stated they are more likely to start a business now they have attended, with none saying less likely (None seemed put off by thinking it is a more daunting task than previously thought as some others have reported) and the remainder unaffected. This could of course be transient and enthusiasm may fade following return from the course.

Question 2: What are your career aspirations?

Career Aspiration	Number of Responses
Work in Industry	16
Technology Transfer	11
Academic position	8
Start Own Business	6
Consultancy	3
Not for profit	1

Slightly surprising is that of 45 respondents few (6) of the respondents wanted to start a business immediately on leaving university despite the self-selecting nature of the course, but many seemed to see how the experience could be useful for those wanted an industry job (16) and a large number were interested in a technology or knowledge transfer position (11).

Question 3: What would be the reason for you starting a business (asked for two options to be selected)

Reason for starting a business	Responses
To Improve Society	22
To be better off financially	20

For the excitement	16
To be own boss	14
To create own job	4
Raise funds for research	2
Status	1
Create a spin-out company	1
Other	2

A variety of reasons were stated for starting a business to Improve Society (22) was rated highest which links with the anecdotal view that many of the students attending had an interest in social entrepreneurship regardless of their background.

Question 4: What factors would encourage you to start a business (Two selected)?

What factors would encourage you to start a business?	**Responses**
If they could see how it would benefit society	22
More training	19
If they spotted an opportunity	18

If they saw more examples from their own area	11
If they became unemployed	6
If it increased chance of getting research grants	5
If it was part of promotion criteria	2
If they had funding	1
Other	1

This is similar to Q3 with a high number (22) of responses suggesting they would start a business if they saw how it would benefit society.

Question 5: What do you feel are the barriers to starting a business (Two selected)?

Perceived barriers to starting a business	Responses
Lack of Finance	19
Lack of Time	13
Lack of Peer success stories	12
Lack of Support	11
Field has little commercial application	10
Lack of idea	10
Risky	6
Seen others have bad experience	3
Other	3

In terms of barriers to students starting their own business, lack of finance was highest rated but interestingly risk was relatively low in the response rankings.

Question 6: When would you ideally start a business?

When would you start your business	Responses

ideally?	
Start a business after gaining industry experience	21
Start a business as soon as you leave university	11
Create an academic spin out company while in an academic position	7
Be an intrapreneur in a larger organisation	6

Most seemed to want to work to gain experience before staring a business or those wanting to create a spin-out venture which would need the respondent to be in a secure academic position. This of course makes it difficult to measure venture creation as an output of this course with such a time delay between training and starting their business.

In summary, improving society was perceived as being the biggest reason for starting a business while lack of finance was perceived as the biggest barrier to starting a business, with lack of time and lack of peers as examples moderate factors. Surprisingly, risk was ranked very low as a barrier as was government policy. The main sources of encouragement for starting a business were stated as if they could see a benefit to society or they spotted an opportunity while working

elsewhere or if they had more training. Many attendees were interested in academic and industry careers to use their entrepreneurial skills and many wanted to start a business later in life when they had more experience.

Questionnaire Two (17 respondents)

The questionnaire completed after eight months was attempting to examine whether Rugby Team framework levels 3 and 4 were being achieved, i.e. were they using any of the skills they had learned incorporating them into their work and in terms of tangible outcomes had any actually started a business.

In terms of Intention to start a business, 5 out of 17 had actually started a business in this time (a level 4 outcome), 6 said they were more likely to start one in the future having been to the enterprise school, 6 reported no change. Enthusiasm for these respondents seemed not to have faded over time for starting a business.

- In terms of being more aware of commercialisation activities within their own department, 7 respondents were more aware of spin out companies within their department and 6 reported no change.

- 15 respondents were more confident of exploiting an opportunity compared to 2 who reported no difference in confidence.

- Following on the theme of opportunity recognition 8 reported that they had recognised a business opportunity from their research since attending the enterprise school whilst 9 had not. However, 15 had recognised an opportunity outside of their research and 2 had not.

- The next set of questions focussed on whether respondents were using any of the skills which the enterprise school aimed to improve.

Table 2: How the students were using their new skills on return to their workplace

Skill	A Lot	A Little	Not at all
Opportunity Recognition	8	8	1
Finance	3	7	7
Market Research	6	9	2
Intellectual Property	5	8	4
Presentation Skills	8	8	1
Group Working	7	8	2
Networking	8	7	2

- Respondents were asked whether they had followed up by attending other entrepreneurial events or activities 9 responded yes, 8 replied no. The additional activities attended included the Biotechnology Young Entrepreneur Scheme, start-up conferences, leadership courses and a number of different one day workshops.

- In order to see if they were effectively networking we asked whether they were still in touch with anyone from the enterprise school 13 responded yes and 4 responded no.

- Also 15 responded that they had made more effort to network since completing the enterprise school, 2 replied negatively. Of these that responded yes, 11 said they were using LinkedIn, 8 by networking at events or conferences, 4 by email, 2 were using Facebook.

Discussion

The study results shown above suggested that the programme was a success in terms of satisfying a number of outcomes defined by the Rugby Team framework. Those surveyed had clearly felt the course was useful and many of those surveyed after eight months were using the skills they had learned back in their workplace, for example spotting opportunities. The number of start-ups created within the

relatively short time of eight months of the course was above that expected by the organisers prior to the course even though clearly the respondents were those that had self selected to attend the enterprise school, therefore had an interest in either starting a business or commercialising research. It must be remembered that many will take many years before they are in a position to set up a spin-out or take advantage of industrial experience to create a venture based on that experience, so it could be many years before the full benefit of training is realised. Since the school was open to all subject areas, it was of interest to see motivations of people who were attending. Many did not in fact plan to start their own business in the near future, many attending were interested in an academic, industrial or technology transfer career. There was also a surprising number that were interested in social enterprise, even those from science subjects and surprisingly many did not rate risk as a major barrier to starting a business, rather finding funding was rated as the main issue. Motivations strongly included wanting to benefit others and students seemed to associate entrepreneurship with creativity and opportunity spotting rather than making money and achieving fame. It also seemed Ph.D. students and postdocs were becoming more aware of the difficulty in obtaining a tenured academic position and are looking to gain enterprise skills, with many of those enrolled for the enterprise school seeming to recognise the importance of spin-out companies as part of an academic portfolio.

The results can therefore be used to effectively plan what skills students will need and address any concerns or misconceptions about enterprise and entrepreneurship

and eliminate barriers. It was useful to note the barriers identified by students which have implications for planning entrepreneurship courses and training for postgraduates. For example, lack of finance could be addressed by getting venture capitalists, banks and grant awarders to explain what would be required for funding and the benefits of each. In addition, we have recently subscribed to a large database of funding sources which has proven very popular with the students. There are many examples of academic entrepreneurs within the university but these might not be visible to students, so more accessible talks by these academics would be of value. From the feedback, students at the Enterprise School have valued guest speakers that are just a few years ahead of them career wise and so can relate to them more easily than speakers who are many years older and far removed in career terms. Also offer training and guest speakers on social enterprise, in particular directed at science and engineering students may be of benefit. These opportunities could be seen as attractive to those wanting to recruit the best academics (Bohm and Phillips, 2015).

Future Work

Since this study included a relatively small number of respondents, it is planned to repeat this study with larger numbers of researchers. It was also be useful to test this model against other forms of enterprise training to examine not only impact but cost effectiveness of each. It is planned to do qualitative research to examine exactly how the skills are now being used in attendees work and attempt to

quantify the benefit to the student and employers. However, it likely to be just as difficult to measure this intrapreneurial activity (Pinchot and Pellman 1999) from those who pursue careers in established companies as longitudinal studies of start-up creation. It would be interesting to look at career trajectories including salaries, promotions etc. to ascertain if the training was having a wider impact.

The Enterprise School could be segmented to appeal to certain areas such as social enterprises, IT, Biotech etc. where the focus of each would be very different and there is a likely market for each. This would allow a more detailed approach e.g. focus on IP issues for biotech rather than the general approach currently taken. Other challenges include increasing uptake by humanities students. Currently large numbers of students apply from engineering and life sciences, to get a better mix of students for improved multi-disciplinary work tapping into humanities would be advantageous.

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Journal of Asia Entrepreneurship and Sustainability

Carbon Markets at the Crossroad: Case of CoreCarbonX in India

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"Carbon, the currency of a new world order" (Paul Kelly, The Australian, 21 March 2007)

Abstract

Sustainability has become the sine qua non of businesses in the modern competitive environment. To remain relevant, firms have started becoming responsible in terms of environmental sustainability and thereby resorting to engagement of *'external agencies'* to look after their carbon footprints and

management of the sustainability index. CoreCarbonx is a case of this identified opportunity by an entrepreneur to work in the area of carbon consulting. Established in 2008, CoreCarbonX is now recognized world over for its expertise and innovative solutions in the areas of Renewable Energy; Sustainable Habitat; Corporate Sustainability, Waste Management; Community Development and Climate Change. However, this transition has not been smooth. The company faced several challenges in terms of resource constraints in the beginning and market & policy changes in the growth phase. This case examines the nature of the opportunity, capabilities and competencies of the entrepreneur, leveraging his competencies to meet the opportunity, and his own values and behavior. The case describes extensive thought process of the founders in diversifying into allied sustainability services to remain relevant in the market and to nurture their entrepreneurial venture. How the founders were able to overcome the market challenges and the initial concerns of business in terms of resource availability is also discussed in the case.

As Niroj sipped his tea and looked into the setting sun, he pondered upon his schedule for the next day. He was supposed to meet the CEO of a paper mill for a sizeable contract. Today was the 7th year of his company. He was happy at what he had achieved and at the same time bothered by the incremental competition. He thought back to the day he pitched the idea to float his company to his parents. Conservative, by all counts, they had brushed his idea aside and went about their daily chores. 2 months later, he had resigned from his job and floated his company in Hyderabad. He recalled how he had to scrape though to the end of each day looking for clients who would advance 40 % of his projected bill so that he could scout for newer clients.

But he believed in the opportunity. He understood the dynamics of the business. As long as he could make people see the effects of carbon and the value that carbon had, he essentially was in control of the supply as well as the demand side of the business. He could advise people on processes to check the emission of carbon on one end and at the other ensure that his reduction in emission could be paid for by larger companies who were looking to offset their higher emissions. He plunged into the business head up. Got a team who believed in the opportunity and thus CoreCarbonX was launched.

Reality of Climate Change

The reality of global climate change cannot be ignored. Inter-governmental Panel on Climate Change (IPCC), which is a community of international scientists have

highlighted on multiple occasions that climate change gets manifested in several forms such as constant rise in global surface temperature, continuous rise in sea-level due to melting of ice berg, depletion of ozone layer, etc. All of this has resulted in increase in natural calamities in the form of hurricanes, typhoons, earthquakes, landslides, loss of vegetation, extinction of flora and fauna, etc. Who is to be held responsible for all of this? Is it rampant industrialization? Are developed economies at fault? Are irresponsible businesses to blame? These are some of the commonly accused entities. But what about the role of developing economies which are home to 80% of the world's population? Developing nations on their path to development are already contributing to 40% of the world's emission. What is even more alarming is the expected increase in such trend. There is also an increasing and accepted belief that solution to this problem of climate change or mitigation measures have to be taken by all nations alike; developed, developing or under-developed. All of this realization needed a policy level support which was given through Kyoto Protocol. Kyoto protocol became all the more significant and a landmark policy framework since it has the widest reach in terms of countries accepting it, pegged at 160 countries currently.

As is true for everything else, so it is for climate too. Change has been the nature of our climate and our planet since it took shape millions of years ago. Life became possible because of the climate and today it is threatening our existence as such. Among other reasons, carbon dioxide is one of the most important facilitators of this uniqueness in our solar system. Emitted from volcanoes, CO_2 trapped heat

radiated from the sun leading to the enhancement of complex life forms. The beautiful green and blue of our planet has been a reality since.

The hot and cold phases of our planet have, at times, rendered to the development of several species and at others made them extinct. A few thousand years ago mankind came into the picture with our drive to explore and experience our curiosities. We harnessed fire, cultivated lands and a few hundred years ago took the leap to mass production. All this while, our actions have, rather unknowingly, never disrupted the composition of our fragile atmosphere, the protective layer over our planet. All this, though, was set to change.

With the industrial revolution, we entered into the phase of no return. With an ever increasing demand, supply needed to keep pace. This supply needed production. Production needed energy and energy necessitated our ever increasing dependence on fossil fuels. Emissions went into overdrive. Exhibit 1 presents the increase in CO_2 emissions since the last 1000 odd years. Exhibit 2 presents the CO_2 emissions since the industrial revolution.

The results of such increases in CO_2 have eventually led to the concentration of greenhouse gases in the atmosphere. As more and more greenhouse gases built up in our atmosphere, they trapped more heat. The same heat that enabled life to germinate and grow has today become its worst enemy. With global temperatures on the increase, the effects are increasingly drastic. Exhibit 3 records the mean global temperatures on planet earth since 1750.

Discussions on sustainability began by 1962 when Rachel Carson published her book titled, "Silent Spring". This book brought together research on toxicology, ecology and epidemology to suggest that agricultural pesticides were building to catastrophic levels. This was linked to damage to animal species and to human health. It shattered the assumption that the environment had an infinite capacity to absorb pollutants. This was followed by another book titled, “The Population Bomb” by Paul Ehrlich in 1968. The book explored the connection between human population, resource exploitation and the environment. Several Non-Governmental Organizations like the Friends of the Earth and Greenpeace were set up by concerned groups in the following years. However it got much of its desired momentum with the publication of Brundtland Commission Report (World Commission on Environment and Development, 1987) which provided for a holistic understanding of sustainable development.

The Carbon Catch 22

Carbon is a magic element. It is the central element in compounds that make life possible. Not just because it is the most prevalent in the atmosphere but also because it is found in all biological compounds that make up the physical existence of all life on the planet. Carbon has been instrumental in forming life and sustaining it. We are a species just like all others on this planet that is driven by energy. Whether it is directly from the sunlight or it is from fossil fuels, it is energy that has been the true life blood of the planet earth. Along with oil, it has been coal

that has propelled us into unprecedented growth, both economically as well as numerically.

A landmark event in the progress of mankind has been the Industrial revolution. It marked the onset of the era of mass-production. It revolutionized our life and put us on the fast track. Machines replaced manual labor. To keep the machines running, we needed fossil fuels. Fossil fuels replaced wood, solar and wind. First it was coal and then it was fossil fuel. What followed was record economic growth. Thus, the relationship between carbon dioxide and economic growth was established.

While it is essential to maintain or even better enhance economic activity leading to growth through job creation and labour utilization, it is also important to create a sustainable planet. The culprit again is carbon dioxide. How do we maintain a balance between emission and maintaining a world that is perpetual? Just like the two sides of the coin, there were two ways to deal with this. Either a tax could be imposed to dissuade excess emissions or a cap could be worked out. Both were harsh realities that governments across the world had to deal with. Discussions, debates and deliberations on these issues resulted in the Kyoto Protocol. Beginning in 1997, 192 countries finally ratified it by 2005 and agreed to introduce a cap system to check emissions. This marked the first global recognition of the fact that global warming was real and to a large extent it was because of man-made CO_2 emissions. Besides Carbon, the emission of other greenhouse gases like Methane,

Nitrous Oxide, Hydrofluorocarbons, Perfluorocarbons and Sulphur hexafluoride were also to be curtailed.

The Carbon Market - A Business Opportunity

The Kyoto Protocol not only recognized the role of carbon dioxide in making our planet unsustainable but at the same time created a new business opportunity. Till then we had traded elements and objects made up of carbon but now we could trade in CO_2 itself. This created a market for carbon. The Financial Times Lexicon defines the carbon market as a market that is created from the trading of carbon emission allowances to encourage or help countries and companies to limit their carbon dioxide (CO2) emissions. This is also known as emissions or carbon trading. Carbon trading is a way of reducing greenhouse gases produced by polluters.

The protocol set a target of reducing emissions by 5.2 % below 1990 level by 2012 collectively by the participating countries. The equation was simple. The system was built around the concept of offsetting emissions. If certain participant country continues with emissions above the targets, then they are required to engage in emissions trading i.e. buying "credits" from other participant countries who are able to exceed their reduction targets in order to offset.

Although the collective target was set at 5.2 %, there were differential targets for developed countries like the United States of America which had a target of 7 %. Similarly, developing countries like India and China were not obliged to reduce

emissions. This meant that the USA could outsource its emission to countries like India and China meaning they could exceed their emission targets by buying credits from countries where the emissions were below the set limits.

Article 17 of the Kyoto Protocol established emissions trading by allowing countries that have emission units to spare (emissions permitted to them but unused) to sell this excess capacity to countries that are over their emissions limits. In effect, this created a new commodity in the form of emissions and created a carbon market. The market facilitates trading which ultimately leads to controlling carbon dioxide (CO_2) pollution by providing economic incentives for achieving emissions reductions. It is sometimes called cap and trade or carbon emissions trading.

Carbon Trade - The Carbon Exchange

Carbon trading is administered by a central authority such as a government or international organization which sets a limit or cap on the amount of CO_2 that can be emitted. Companies or other groups are issued permits that require them to hold allowances (or credits) in order to emit an equivalent amount of CO_2. The total amount of allowances and credits cannot exceed the cap, limiting total emissions to that level. Companies that need to increase their allowance must buy credits from those who pollute less. The transfer of allowances is referred to as a trade. The buyer therefore pays to pollute, while the seller is financially rewarded for reducing CO_2 emissions. In theory, those that can easily reduce emissions most cheaply will do so.

Carbon emission trading has been steadily increasing in recent years. According to the World Bank's Carbon Finance Unit, 374 million metric tonnes of carbon dioxide equivalent (tCO2e) were exchanged through projects in 2005, a 240% increase relative to 2004 (110 mtCO2e). In 2008, the carbon market was valued at $47 billion, while in 2009 the World Bank estimated its value at $126 billion. The value in the market attracted significant players. Apart from the smaller local players, the market drew the attention of the Big 4 in the consulting business. PWC, E&Y, KPMG, Deloitte, First climate, General Carbon are some of the noteworthy names in the industry. With reach into the market, capability that can be harnessed and accessed at ease, the market is getting fragmented at a rate faster than previously thought.

About the Company

Back in 2003, a student of the MBA programme at one of the country's premier B-School was one such concerned individual who spend his days talking about carbon, carbon exchange and the business of sustainability in most of his classes and elsewhere in campus. Such was the impact of Niroj Mohanty's talks and dialogues that his batch mates started calling him "Carbon Mohanty". Graduating with a high CGPA, he had companies offering attractive packages during campus placements. However, it was not just the package which attracted Carbon Mohanty, he was looking for an opportunity to work in the domain which was aligned with his objective of doing something big in the carbon market and sustainability

business. ‘Opportunity came knocking’ was not so true a phrase for him. Instead he took the hard call to go find the opportunity and knock its door.
His career began in an international NGO, which proved to be an initial launch pad in sustainability business. After working for five years in different companies and giving business worth several crores, in March, 2008 Carbon Mohanty finally decided to start his own management consulting firm. Refer to Exhibit 4 for a detailed profile of Niroj. This marked the beginning of CoreCarbonX. A company built around carbon and sustainability. This was not an easy decision to take. In the initial years, he faced several issues in setting up a niche business. Market fluctuation, limited entrepreneurial support, and finding a dedicated team were threatening his decision. But, these were just a few with several others about to make their appearance.

As CoreCarbonX continued on its path to glory, the founding team began to realize the realities of business. Crises and mitigation became an order of the day for the engineers with MBAs. They needed answers to prevent crises from recurring. Refer to Exhibit 5 for the organizational chart of CoreCarbonX. Entrepreneurial mindset and learning of business acumen developed gradually with a necessity to expand and diversify their portfolio. Fluctuation and influence of international market on pricing & business added new challenges.

Since its incorporation, CoreCarbonX has been working with clients in recognizing green and clean opportunities and threats in the emerging economy. They helped

organizations in anticipating changes in the market, helping in developing strategies for their business, improving their operations and risk profile, and accelerating their organizational performance to seize the most attractive opportunities. They also provided services including project design and evaluation as well as special studies on climate change adaptation in vulnerable areas. Within few years, competition, opportunity and reality forced diversification to allied areas. The team had broadened its horizon into sustainability and climate change mitigation, which, of course were connected but saw even more competition. They began assisting companies in sustainable strategic advisory and auditing services and worked to inspire businesses for creation of business values with speed, certainty and strategic dexterity. Business was growing and so was the company.

In addition to providing consultancy services in the carbon market, the company began offering varied and diverse solutions in areas like water sanitation and biodiversity by combining extensive experience, comprehensive capabilities across all industries and sectors. They worked with clients in recognizing opportunities and threats in the emerging economy and helped organizations to anticipate changes in weather patterns due to climate change. But the core still remained intact. They spent almost 60 % of their resources in providing services in areas like the impact of greenhouse gases emissions and climate change impact on various business activities.

Availability of Clean production technology, pro-climate government policy and increase in general awareness towards the downside of carbon emission has resulted in lower emissions. Lower emissions led to a decrease in trading possibilities. In response to the situation at hand, the Core CarbonX team of qualified professionals (refer to exhibit 5 for a detail of the CoreCarbonX team), developed competencies in a wide range of climate change mitigation and adaptation techniques across sectors including:

- ❖ Household biogas and improved biomass cook-stoves project
- ❖ Renewable energy projects (wind, solar, hydro, bio-fuel, Cook stove, Biogas, Gasifier)
- ❖ Engineering, Procurement and Construction of roof top solar PV power plants from few kW to MW
- ❖ Energy efficiency projects
- ❖ Biomass (anaerobic digestion of effluent, animal and agricultural waste)
- ❖ Composting and Landfill gas capture
- ❖ Fuel switching
- ❖ Super critical power project
- ❖ Natural Gas based Power project

They also worked with clients in recognizing green and clean opportunities and threats in the emerging economy (refer to exhibit 6 for a list of clients). Their core competencies include

- Preparation of Corporate Sustainability Reports as per GRI Standard
- Evaluation & preparation of Sustainable Development Projects
- Emission Management Services
- Renewable Energy Certificates Compliance Auditing
- Clean Development Mechanism
- Development of Carbon Abatement Projects
- Engineering, procurement & construction of Solar Power Projects

The Dilemma for Carbon Mohanty

The company is gaining ground in terms of client base and business. But competition is getting tougher with each passing day. Several NGOs had started offering similar services in sustainability and climate change mitigation solutions. The strain on resources both internal as well as in the market was enormous. Some of the international NGOs paid handsomely to experienced hands like the ones available with CoreCarbonX. For the first time, Niroj was beginning to face people issues. There was chatter on pay hikes, better work environment, smarter perks etc. Niroj thought to himself, what happened to the motivation to bring about visible change in the world that his team had shared with him?

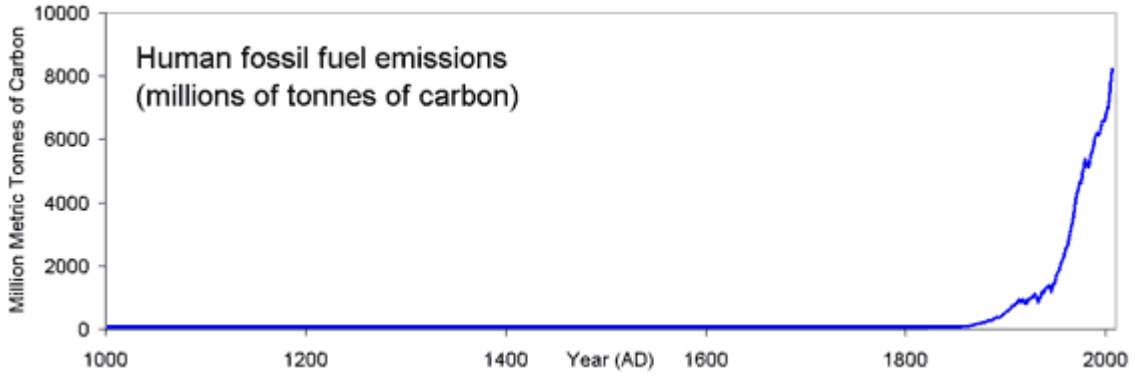
Going forward, Niroj was consciously evaluating if the company had diversified too much? His team was beginning to show signs of disinterest. From carbon to

climate to sustainability to biodiversity, it is clear that all these areas are interlinked but in the market, there were players in each of the micro segments. That was beginning to hit him hard. There were cost pressures that a medium size firm has to tackle unlike the larger ones who have the benefits of operating at scale.

He was well aware that the overall business environment was going through tremendous changes itself. Every passing day, new technologies were being made available to industries wherein emission control was preinstalled. Many new and growing businesses were rather interested in such technologies. These were the target that CoreCarbonX had. Now with technology, they were already beginning to lose certain clients. Niroj wondered what could check the outflow of his clients. What kind of strategies would work best in such cases?

Journal of Asia Entrepreneurship and Sustainability

EXHIBIT 1: CARBON DIOXIDE EMISSIONS SINCE 1000 AD



Source: Carbon Dioxide Information Analytics Centre

EXHIBIT 2: CARBON DIOXIDE EMISSIONS SINCE THE INDUSTRIAL REVOLUTION

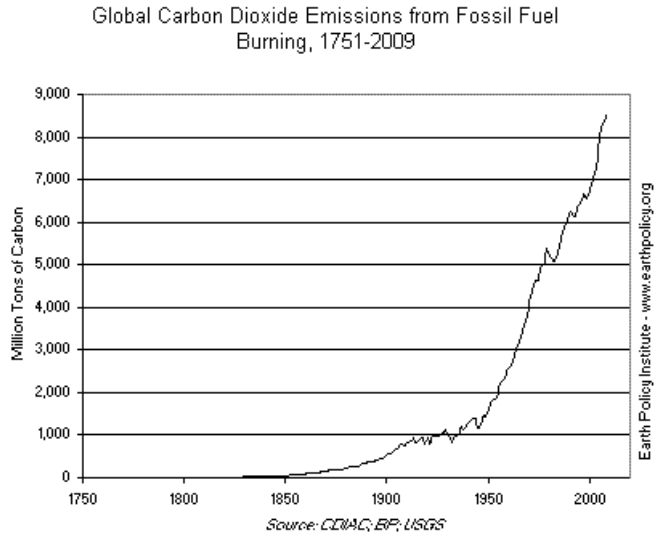


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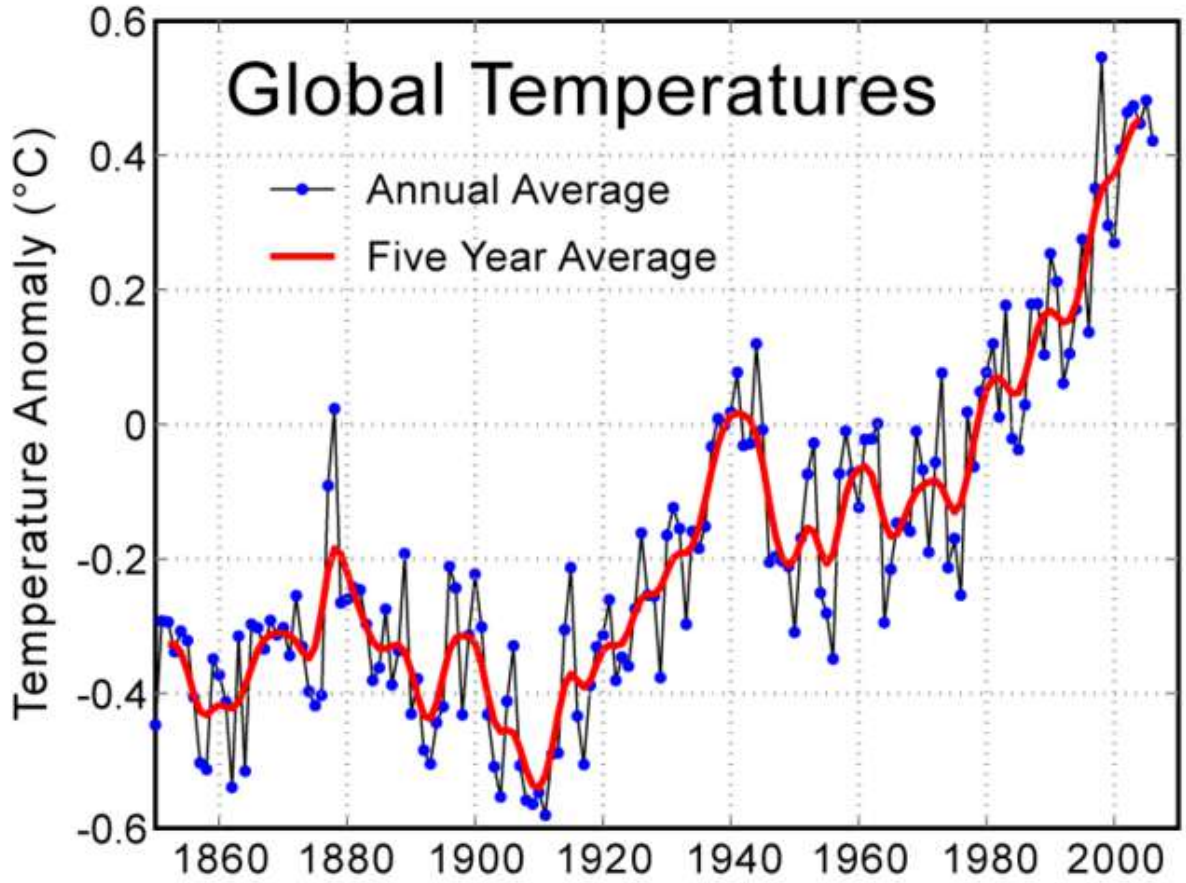
EXHIBIT 3: Global Mean temperatures since 1750



Source: https://chriscolose.wordpress.com/2007/12/18/the-scientific-basis-for-anthropogenic-climate-change/

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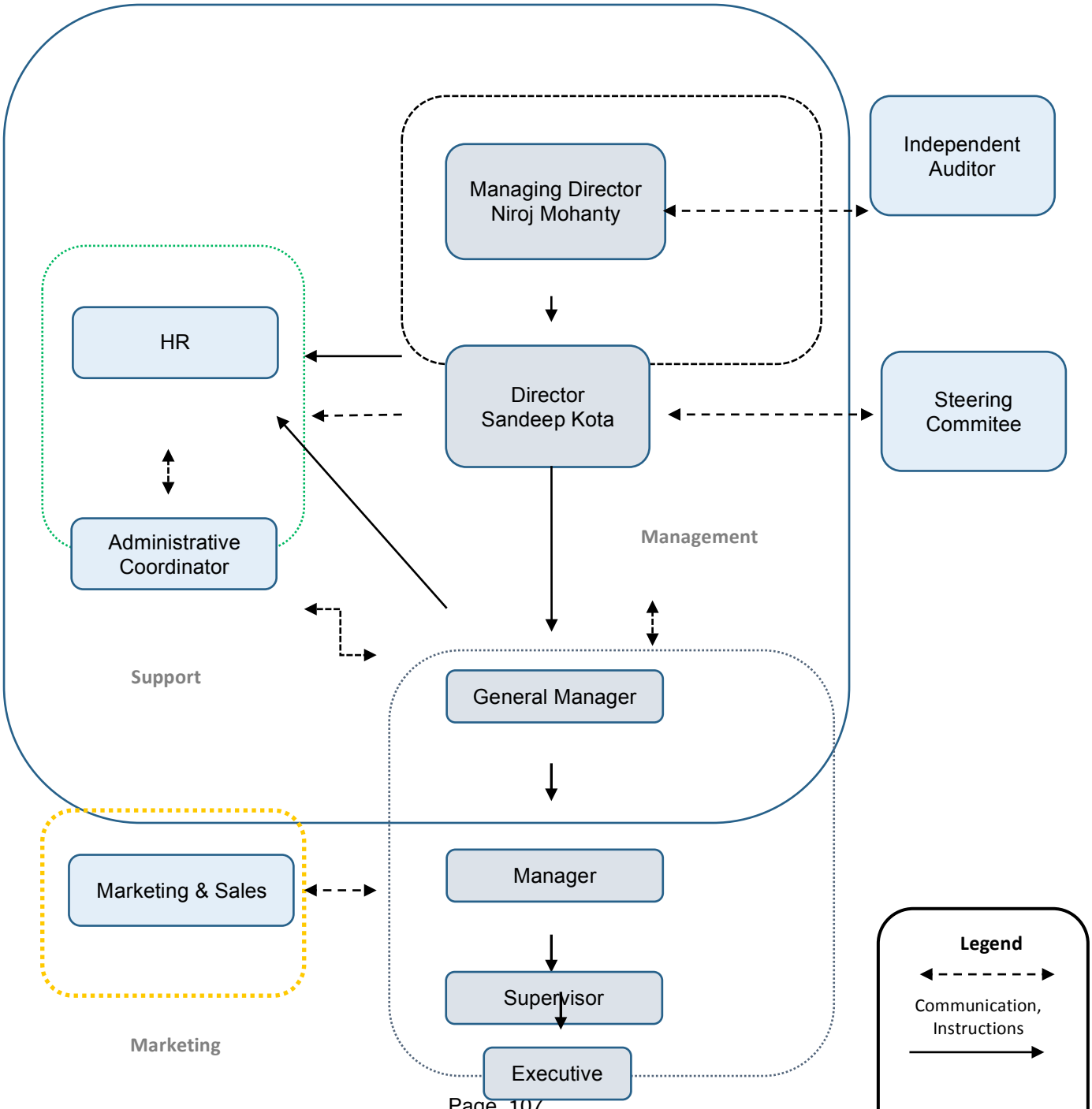
EXHIBIT 4: ORGANISATIONAL STRUCTURE



Pre-Service ELT Teachers as Future Enterprising Teachers

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Abstract

This paper focuses on the importance of educating enterprising teachers and shares the perspectives of 62 sophomore pre-service English Language Teaching (ELT) major university students on an elective course called enterprising teaching during 2014-2015 (12 students), 2015-2016 (15 students) and 2016-2017 (35 students) academic years. The investigation takes after the qualitative research worldview; the itemized and contextualized cites plan to give a detailed portrayal of members' encounters. Data were collected through two open ended questionnaires. The first one included five open-ended items and was given at the beginning of the semester and students were requested to share their feelings on entrepreneurship, enterprising teaching, characteristics of entrepreneurs, characteristics of effective teachers and the relationship between education and entrepreneurship before the course starts whereas, the second one item open-ended questionnaire was given at

the end of the semester and aimed to collect students' reflections on the impact of the course.

The main aim of the study was to ascertain how this group of ELT-major university students felt before taking the course and how the course influenced their opinions and thinking on entrepreneurship, relationship between entrepreneurship and education and enterprising teaching after taking the course.

The study also highlights the importance of ELT teacher education students' awareness, learning and development in the context of entrepreneurship/enterprising education which has received almost no attention worldwide.

Introduction

On the one hand, inexorable parade of new technological advances disrupts the norm, change the way individuals live and work and modify the qualities in all social societies. On the other hand, financial crisis, combined with rising inflation and its inevitable consequence, stagnation and recession in global economy, environmental changes, terrorism, demographic changes, political instability, changing power equation across nations and regions, human right violations, massive immigration and refugee problems are causing the world to go through one of the most remarkable periods in history.

These unprecedented social, economic, technological, political and environmental problems desperately put human beings in a need of change and improvement in many different areas both on a local and global scale.

Presently like never before, we require innovative advancement, new arrangements and solutions, innovative methodologies and better approaches for thinking and executing the tasks. We frantically require individuals in each part of life and at all levels and ages who would think without box to recognize and seek after opportunities to tackle issues, to come up with solutions and help to make a better world to live in.

The strategy of the European Union accentuates the significance of creating entrepreneurial culture by supporting the correct attitude and mind-set, entrepreneurship skills and awareness and familiarity with career opportunities (Commission of European Communities, 2006). The report stated limited progress and member states and educators were encouraged to 'redouble efforts', to 'increase the efficiency of investment' and to create 'new initiatives' (European Commission, 2006:5–6). Educators and policy makers across Europe are devising new curricula, revisiting pedagogy and enhancing the culture of schools as learning communities and Finland should be given an extra credit for the efforts of entrepreneurship education (Hannon, 2006; Ministry of Education of Finland, 2009; Seikkula-Leino, et al, 2010; Altan, et al., 2014).

Entrepreneurship and entrepreneurship education are usually seen and dealt with as part of business studies (Gibb, 1993), though many programs were created and studies have been carried out relating entrepreneurship to education (Diensberg, 2008; Gibb, 2005; Altan, et al, 2014; Altan, 2015). As Gibb (2005) states, entrepreneurial pedagogy stems from the reality of entrepreneurship. Though Remes (2003) as cited in Gustafsson-Pesonen (2012) guides us on entrepreneurial pedagogy, the guidelines are far from describing how the whole education system could be carried out entrepreneurially.

Although entrepreneurship and entrepreneurial development is seen the main engine for the prosperity of most nations (Gorman, et al., 1997; Sunter, 1994), education is still the main precondition and indispensable element in bringing this vision to come true (Reynolds, et al., 2002; Altan, 2014).

It is possible to see both enterprising and entrepreneurial to define entrepreneurship education with a slight difference where entrepreneurial is generally used to refer business activities, enterprising is generally used for any context (e.g. Gibb, 2005). In this article enterprising has been preferred however, entrepreneurial is also used to refer educational context unless otherwise it is pointed out.

If main enterprising determinants like risk taking, confidence, initiative taking, creativity, that is entrepreneurial mindset lack, absent and not enforced in general

education systems at all levels it becomes highly critical and difficult to create a culture where to grow enterprising individuals ready to manage economic growth and prosperity and solve ever increasing local and global problems.

Education & Entrepreneurship

Education has the power to improve the feelings of insecurity and instability caused by unprecedented changes and problems, provided that education is organized to promote the development of entrepreneurial character within individuals. This vision definitely requires a fundamental rethinking of educational systems, the way teacher educators and teachers are trained, the way courses are designed and thought and how the learners are assessed.

Entrepreneurship and education are two very important opportunities that need to be interconnected and paid extra and careful attention if we want to develop the human potential required for building the affluent and peaceful inclusive societies of the future (Schwab, 2009).

"Why is the question of entrepreneurship in the education system becoming more important?" Gibb, 2000:6). Why to support entrepreneurial teaching, entrepreneurship as a teaching or as an education philosophy? Continuing complex problems require more people with entrepreneurial behaviors of all kinds. Entrepreneurship usually deals with continuous problem solving and facing challenges. Therefore, individuals with entrepreneurial mind sets take the

responsibility and act proactively and be change agents in their environments. And this phenomenon creates new challenges for teacher educators and teachers. That is, growing more entrepreneurial thinking individuals!

Entrepreneurship is not a new idea but rather has never been more imperative than it is today in this time of financial crisis, both at local and worldwide scale, and enormous societal difficulties. Innovation and entrepreneurship are conceivable potential instruments to provide solutions by building feasible improvement, creating jobs, producing recharged economic growth and propelling human welfare for the worldwide difficulties individuals have been confronting in 21st century and will keep confronting ahead. And education has the potential to develop the skills to generate the entrepreneurial mindset needed to prepare future leaders in all sectors, entrepreneurs, to solve more complex, interlinked and rapidly changing social and economic problems of the world (Altan, et al, 2014).

Teachers themselves are often been accused of being the greatest obstacle in entrepreneurship education (Gustafsson-Pesonen, 2012; Altan, 2015). Therefore, changing teachers' thinking and teaching should be the main aim in creating an enterprising education. As Schwartz (2006) asserts, educational change is more about educating teachers than educating pupils. Therefore, teacher learning and reflection should be given priority for a real change and success.

Teachers have the duty to build up the discovery, thinking, and execution abilities of our students so they may exceed expectations in exceedingly questionable conditions. These skills will improve the probability that our students will have the capacity to distinguish and catch the correct opportunity at the right time and for the correct reason. The question here is, who will practice this kind of teaching? The answer is entrepreneurial teaching can only be practiced by entrepreneurial teachers (Fiet, 2000; Gibb, 1993; Altan, et al, 2014).

"Education is universally accepted as an essential element in the process of national development and prosperity. And there is no doubt that teachers play a significant role to the success of any educational system for a positive societal change. Quality and well equipped teachers can lead the education to the highest quality" (Altan, 2015:37).

"Entrepreneurial education implemented by entrepreneurial teachers has a potential power to help the world to create economic growth, jobs, innovation and to raise happy citizens capable of finding solutions for many long lasting and ever growing global issues" (Altan, et al, 2014:241).

"The entrepreneurial teacher will be one who masters the art of: knowing how much ownership and control of learning to give students; maximizing social learning; encouraging student networking; developing motivation and commitment of students to see things through; encouraging calculated risk taking; seeking and

taking up opportunities in an innovative fashion; and involving students in taking personal responsibility for the development of learning" (Gibb, (2000:8).

The idea of e entrepreneurship is not new and for the most part relies on economic theory and regulations and contends that the entrepreneurs can move economic reserves from a basic level into a more prominent and higher efficiency level (Drucker, 1985). Therefore, any type of change in economic balance is a result of innovative entrepreneurs who see change as the main benchmark for the development and grow of a healthy economy. These changes are generally recognized to be opportunities for entrepreneurs in order to innovate, to create new ways of doing things, and even to create resources for further economic and social development necessary for the growth nations. Therefore, Drucker defines the entrepreneur as the one who always searches for change, react to it, and consider it as a possible opportunity (Drucker, 1985).

"The concept of entrepreneurship is often associated with the concept of innovation. Such innovation does not always have to be economic or technological or even result in a tradable product for the market. Innovation can be in every sector related to humanity. Therefore, entrepreneurs and the practice of entrepreneurship can be found in every part of life and in any type of organization" (Altan, 2015:38).

"On the one hand, entrepreneurship is complex, chaotic, and more importantly lacks any notion of linearity" (Neck & Greene, 2011:55). The present world style of view usually focuses on a linear process and it is believed that if it is carried out

correctly, it will increase the possible venture success (Neck & Greene, 2011). On the other hand, it is a common belief that entrepreneurship is easy to teach, talk on it and give lectures and seminars about! Therefore, the steps of entrepreneurship education are usually; introductory entrepreneurship course followed by electives such as opportunity, entrepreneurial marketing, entrepreneurial finance, and managing (EC, 2008). And the learning methods usually used in such training programs include lectures, presentations, handouts, group discussions. These types of teacher centered traditional education methods based on theory are themselves irrelevant to the philosophy of entrepreneurship. However, it must be admitted that in recent years more emphasis on more active methods has been introduced, such as Fiet (2000) introduced a method to develop students' skills necessary to make better entrepreneurial decisions.

"And not to forget of attending here and there, hit and run type seminars given by so called entrepreneurs or gurus of the field! As a result, it is assumed and expected that individuals having such courses and attending such seminars would automatically have entrepreneurial mind- sets and eventually practice entrepreneurship" (Altan, 2015:38).

Entrepreneurship education and Entrepreneurship as a teaching Philosophy

Although it is usually stated that entrepreneurship education is a lifelong learning process and should be started as early as elementary school and progress through all levels of education (Lonappan, 2013), teaching entrepreneurship as a method concept lacks a very important part and seems unable to explain of how this

method could help students to know more about themselves so that we could be away from the monolithic personality of entrepreneur as discussed by Neck and Greene (2011). As suggested by Jennings and Hawley (1996) many entrepreneurship training programs are far from both creating and addressing the real needs of future entrepreneurs. Therefore, Altan, (2015) advocates that "instead of creating specific courses designed to educate entrepreneurs either as a process or as a method even at elementary level, the whole education system from kindergarten to post graduate education should be designed entrepreneurially so that individuals could build entrepreneurial mindsets to help them to perform entrepreneurship in every area and in every part of their life" (Altan, 2015:39). And he continues proposing that "entrepreneurship education should be embedded within the standard curriculum instead of an add-on in certain classes, as it is the case of today's practices. (Altan, 2015:40).

As Altan, 2014 asserts everybody possesses entrepreneurial mind-set; however education systems blind and eventually kill these traits in individuals. Therefore, entrepreneurial teaching has more relevance today than ever before. "Entrepreneurial education implemented by entrepreneurial teachers has a potential power to help the world to create economic growth, jobs, innovation and to raise happy citizens capable of finding solutions for many long lasting and ever growing global issues" (Altan, et al, 2014:241).

Enterprising or Entrepreneurship instruction should be taught entrepreneurially. This, in turn, will make the education enterprising (Altan, 2014). Entrepreneurial teaching or instructional method is still observed as the part of business studies and teaching entrepreneurship frequently utilizes business phrasing, techniques and methods. This misguided judgment is a critical issue when we discuss entrepreneurial pedagogy or teaching. Since education predicates culture, in the absence of entrepreneurial culture it becomes nearly impossible to grow entrepreneurial individuals needed in every sector not just in business. Therefore, it is wiser to question the existing education systems critically.
If we can take entrepreneurship as a teaching or education philosophy, we can help individuals to comprehend, create, and practice the skills and methods required for productive enterprise at all levels and areas (Altan, 2015:40).

"Approaching entrepreneurship as a teaching philosophy means teaching a way of thinking and acting built on a set of assumptions which take individual differences into consideration and use alternative assessment techniques to encourage creativity, risk taking, critical thinking, etc. that is all necessary qualities to have an entrepreneurial mind-set"(Altan, 2015:40).

"This type of education will involve developing behaviors, skills and attributes applied individually and/or collectively to help individuals and organizations of all kinds to create, cope with and enjoy change and innovation. In an ever-changing world, we need to teach with the philosophy to help individuals to cope with

problems and come up with creative solutions" (Altan, 2015:40). Development of individuals with entrepreneurial competences instead of developing entrepreneurial competences should be aimed.

Since possessing knowledge of entrepreneurial skills is totally different than working in an enterprising manner, future teachers should be educated and encouraged to teach in an enterprising manner in all their educational activities. Frequently it has been accounted for that the greatest obstacle in entrepreneurship education are the teachers and their states of mind towards entrepreneurship (Pesonen & Remes, 2012; Altan, 2015).

Being an entrepreneurial teacher mainly depends upon individuals and their innovative ways of doing things. Altan (2015) believes that "the entrepreneurial spirit is definitely the result of both biology and culture. Unless the education culture is based on cultivating, enriching and assessing these qualities, it is impossible to teach them formally by just opening some courses or organizing some seminars. The challenge is to allow individuals to experience and feel the concept rather than just learn about it in the conventional sense" (Altan, 2015:40). According to Remes' (2003) model of entrepreneurial teaching method is an inventive learning occasion where learners work freely to make new items and services. And teacher's duty in this process is to create the necessary conditions for such learning by supporting and instructing as a mentor. Such a mentorship

definitely requires the teacher to be familiar with the learning process of entrepreneurship which is envisioned!

Since "entrepreneurial approaches in the classroom will demand high levels of teacher competence" (Gibb, 2000:1), teaching entrepreneurial skills to future teachers will definitely require a considerable change in the approach to education and a paradigmatic shift away from traditional mathematical/linguistic, that is IQ based left brain centered education widely practiced all over the world (Altan, 2015).

To prepare global, creative, risk taking, critically thinking, entrepreneurial individuals for our futures, education systems should not harm their curiosity, imagination, desire to be different by imposing outdated practices and assess with high-stakes standardized tests designed for "one size fits all" philosophy. Instead, education should be able to enhance human curiosity and creativity, encourage risk taking, and cultivate the entrepreneurial spirit (Altan, 2014).

"Approaching entrepreneurship as a teaching philosophy means teaching a way of thinking and acting built on a set of assumptions which take individual differences into consideration and use alternative assessment techniques to encourage creativity, risk taking, critical thinking, etc. that is all necessary qualities to have an entrepreneurial mind-set" (Altan, 2014:39). Through this type of education model

we will be able to educate people having enterprising mindset which in turn help us developing an enterprising society.

Can these behaviors be developed in individuals? Or are they genetically encoded? The question whether entrepreneurship can be taught and even be learnt has been one of the main debates in entrepreneurship research (Edwards & Muir, 2005; Rae, 1999). Nature vs nurture?

I believe that the entrepreneurial spirit is definitely the result of both biology and culture. Unless the education culture is based on cultivating, enriching and assessing these qualities, it is impossible to teach them formally by just opening some courses or organizing some seminars. The challenge is to enable people to experience and feel the idea as opposed to simply find out about it in the regular sense.

The teaching method ought to encourage learning by doing, by transferring, by replicating, by experimentation, by risk taking and positive slip-up making, by inventive critical thinking, by input through social association, by performance and pretending, by close exposure to good examples and specifically, connection with the outside world.

Entrepreneurship education & Turkey

As result of the developing interest in entrepreneurship all around world, Turkey also witnesses ever increasing interest in entrepreneurship and entrepreneurship education. Currently there is a great deal of activity going on, mainly in business schools at universities. A government institution, the Small and Medium Enterprise Development Agency (KOSGEB) plays the main initiating role in promoting and developing entrepreneurship movement (Gürol & Atsan, 2006).

Since EU 2020 strategy places the creativity, innovation and entrepreneurship topics in the youngsters as important in education, topics related to entrepreneurship have been added to the primary, high and higher education syllabi and in country's strategic plan. Additionally, entrepreneurship has been included in Lifelong Learning Strategy Document and Action Plan of Turkey (2014-2018) and in Ministry of National Education Strategic Plan (2010-2014).

Entrepreneurship is also available in primary education course program developed by Turkish Ministry of Education since 2004 (KOBI, 2015).

On the paper it seems that everything is in order but to be honest the reality and implementation of the plan is hazardous.

Method

The study takes after the customs of the qualitative research paradigm which gives an extensive variety of depiction of students' observations and self-reflections identified with the course and entrepreneurship in general. This kind of inductive qualitative content analysis allows the researchers and the readers in-depth understanding of participants' personal experiences. As discussed by Dörnyei (2007:147), this type of analysis provides "unobservable mental processes such as thoughts, feelings, motives or attitudes".

Participants

Participants were 62 sophomore English Language Teaching (ELT) major students who took the elective course called Enterprising Teaching during 2014-2015 (12 students), 2015-2016 (15 students) and 2016-2017 (35 students) academic years respectively. This course is the one and only course taught in an ELT program at a faculty of education in Turkey. The average of 21 years; the youngest student was 19, the oldest 28. There were 52 female and ten male participants. All participants were native speakers of Turkish. All of them had been studying English for a minimum of 10 years at the time data were collected.

Data Collection

The data collection instrument includes six open ended questions and specifically was designed for this study. The first five questions were given at the beginning of the semester during the first meeting of the course while the last question was

given at the end of the semester during the last meeting of the course. Participants were asked to reflect their thoughts related to entrepreneurship, entrepreneurial teaching course, characteristics of entrepreneurs and characteristics of effective teachers along with the relationship between education and entrepreneurship. The respondents were assured that their reflections would be used for research purposes only and they are not required to write their names on the papers except for their gender and age and their information would definitely be kept confidential. Therefore, no names were assigned for the respondents and each respondent is indicated with a number sign (#). In order to increase the internal consistency, another faculty experienced in qualitative research was asked to develop codes from the transcripts. When compared with that of the researcher, the consistency was calculated to be 92%, which meant that a considerable number of the codes developed were consistent. Similar method has already been used in some research (Altan & Sağlamel, 2015).

Results and Discussions

The first question was about what comes to their minds when they think of entrepreneurship. It is not surprising that most of the participants shared its relation to business. Their views are in line with previously mentioned literature.

> *When I think of entrepreneurship, it is relation to commerce come to my mind first (#14)*

It is not being optimistic and seeing the full part of the bottle, it is more about seeing the empty part of the bottle and being aware and analyze what is missing in the society (#5)

Entrepreneurship is to create opportunities even when there is impossibility (#8)

Trying something new that nobody tried it before (#50)

I think entrepreneurship is about being sure about oneself, creating something new, having the ability of organizing things and having the courage of taking risks (#18)

Entrepreneurship is about starting up a new business (#27)

When I hear this word at first, economy comes to my mind. I thought that entrepreneurship was related to the process of starting a new business. (#52)

It is being practical and evaluating opportunities and being extraordinary, seeing things differently which nobody sees (#46)

The second question was about their feelings when they first hear and see the name of the course. All of the respondents expressed their surprise when they first heard and saw the name of the course (Enterprising teaching) and made them to think of the relationship between entrepreneurship and teaching.

I was excited and curious about the course. Because I did not hear a course name like this before! And I thought that teachers can also be entrepreneurs (#17)

When I first heard and saw the name of the course, I thought that teaching and entrepreneurship can be related (#24).

In fact, I questioned the relationship between entrepreneurship and teaching when I first heard about entrepreneurial teaching (#12)

I thought that we would learn how to become an educational entrepreneur (#36)

I thought this course could encourage students who want to be different than ordinary teachers and also be "real teachers" (#20)

I was surprised since I have not heard such a course with this name before (#48)

I thought that we are going to learn something interesting in the end. And, the name of the course attracted my attention and I questioned the relationship between entrepreneurship and education (#21)

The third question was about what they think of the characteristics of entrepreneurs. All of the participants shared nearly similar features. It was highly interesting to learn that they are aware of generally mentioned characteristics of entrepreneurs.

> *An entrepreneur is self-confident, open to different views, has the power to influence and change people around and capable of shaping/interpreting new information s/he gets from associates (#3)*
>
> *They are individuals who have big dreams and always desire better (#5)*
>
> *They are right brain dominant individuals (#9)*

Entrepreneurs are creative, risk taking, self-confident, passionate and motivated individuals (#23).

Self, confident, creative and ambitious (#36)

They are creative risk takers who do not need someone else to take action. They have a different vision and they are not afraid of failing (#13)

Being brave, open-minded, creative, modern and self-confident (#33)

The fourth question was about what they think of the characteristics of effective teachers. This question is highly important since they are all going to be teachers in two years' time and it is hoped that they have a clear picture of effective teaching and teachers. Respondents seem highly aware of the characteristics of effective teachers. Some of the characteristics are related to entrepreneurs along with its relation to business. Characteristics used to define entrepreneurs are important since they are generally used to define effective teachers too (Altan, et al., 2014).

> *In my opinion, they are self-confident and like orchestra chefs, their courses on are based on student performances, they use active learning strategies (#14)*
>
> *Effective teachers are dedicated, creative people who try performing their best (#25)*
>
> *Effective teachers are those who are open to change (#1)*
>
> *Effective teachers are good risk takers to accomplish their goals. They have strong intuition and persuasion skills (#10)*

They are self-confident, they teach what students need in real life and they respect students' individual differences (#32)

Effective teachers are those who can shape lives of individuals (#22)

First of all, Teachers should be a good model for the students. Secondly, should have effective communication skills. Thirdly, should be modest, fair, open-minded and without prejudice (#48)

The fifth question was about the relationship between education and entrepreneurship. Respondents touch different aspects of the relationship between education and entrepreneurship. It is clear that from the responses that Most of the students managed to make a connection while very few of them could not see any connection as in the example of (#2).

Entrepreneurship can support teachers in meeting the demands of society (#26)

Change as well as innovation is a must in education. To achieve this, educators must act like entrepreneurs (#1)

I don't see any relationship (#2)

Teachers should be open to new ideas. Therefore, they are closely related to each other (#4)

Both need to meet people's needs (#58)

They have strong a connection. Education sector should include elements related to entrepreneurship in order to be more effective. Education needs entrepreneurial spirit and dynamism (#19)

They both need to be novel and courageous people and ready to take initiatives (#51)

And finally the sixth question dealt with the outcomes of the course. Participants were asked to share their perceptions related to the course at the end of the

semester. To be honest, it is obvious and heart touching to see that the course has reached the intended aim and managed to raise students' awareness on the relationship between entrepreneurship and education and with the same token on the philosophy of entrepreneurial teaching.

I have learned a lot of things but most importantly I learned that entrepreneurship is not just a matter of commerce world. Iı learned that entrepreneurship is related to education as well. A teacher can be an entrepreneur (#17)

This course helped me to see the problems of our education system and encouraged me to come up with some creative solutions when I become a teacher (#23)

This course helped me to change my beliefs, thoughts related to teaching. I now know what type of teacher I want to be (#1)

In fact, entrepreneurship, creativity, and innovation are qualities the humanity has already been equipped with, and they need to be revitalized; nevertheless, we should know that teachers should be the leaders in this process (#7)

I was thinking that entrepreneurship is all about economy but now believe that everybody can be an entrepreneur in every field, even teachers in education. I will always remember my experiences about this course (#61)

I took a course called entrepreneurship during my high school education but it was meaningless. So the course made me to understand that entrepreneurship is not something meaningless as thought before. The course helped me to become more courageous like an entrepreneur (#11)

The course changed my perspective about effective education as well as education system (#10)

I learnt many things about what entrepreneurship is and how it could be applied to teaching (#63)

Entrepreneurship is not only related to economy and business but also related to being a teacher. I learned how a teacher can create a different learning environment where students are not bored and happy. Now, I know that I can make a difference when I become a teacher (#13)

Entrepreneurial teachers have certain characteristics of effective teachers. As a result of entrepreneurial education, entrepreneurial teachers can raise successful and happy citizens who can create innovation and help economic growth (#26)

Limitations of the Study

Although the research has reached its aims, the study was limited to pre-service ELT-major university sophomore students taking the enterprising teaching course at XX University during 2014-2015, 2015-2016 and 2016-2017 academic years.

Discussion and Conclusions

As Altan, 2015 affirms, educators are in a focal part in executing enterprising education and training, and all the more vitally in finding the best procedures. Therefore, teacher education programs ought to be intended to give entrepreneurial pedagogy so that future teachers could without much of a stretch actualize it in their classrooms. In educational setting it is the behaviors associated with entrepreneurship that are important.

The enterprising teaching course the participants have taken is the one and only one at a faculty of education in Turkey. Therefore the results mean a lot and could be used for further studies.

It is pleasing that that the course have made a clear impact on students' mindsets and made them more aware of entrepreneurship and its relationship with education and it could easily be stated that the findings truly reveal a very important basis for entrepreneurial teaching and developing entrepreneurial teachers for creating entrepreneurs in every single sector for a better and prosper future.
Results reveal that participants are aware of characteristics of successful entrepreneurs and of effective teachers which validates the key concept that comparing effective teachers to successful entrepreneurs could result in valuable insight for teacher education programs and contributes to our understanding of professional identity and its formation.

If we can manage to train teachers with entrepreneurial mind sets, teachers, through cooperation with colleagues, school administration, students and the society teaching is taking place and especially with their students, can definitely create an enterprising environment in their school which can result in a total change in education. What's more, if we can accomplish making enterprising education accessible to everyone at all levels of education young and adult without separating, we would have the capacity to get ready creating entrepreneurs in each

sector who would lead and shape our foundations and businesses both in local and international communities.

To create a real entrepreneurship development through teaching and learning, we need something else than standard textbooks, traditional classrooms, standard teachers and fact-based left brain dominant ordinary teaching. Entrepreneurial teaching seeks to appreciate, augment and nurture entrepreneurial capacities and capabilities amongst learners by providing them more autonomy, choice, responsibility in the learning process through collaborative and reflective learning and alternative assessment techniques. Education system at all levels should be organized with this vision by breaking down traditional ways of teaching silos! But as real champions of change, entrepreneurial teachers should not wait someone to create the change for them. Therefore much will depend upon our vision to promote and manage entrepreneurial teaching and manage to educate teachers with entrepreneurial mindset.

Speaking about entrepreneurship, creating hit and run style seminars, workshops or opening courses mainly in business schools definitely are not and will not be enough and in fact they are useless and in vain! I strongly believe that such not carefully designed and managed activities actually kill the entrepreneurial spirit of individuals and make them to act un-entrepreneurially instead of making them aware of entrepreneurship and taking their entrepreneurial spirits out.

As Gibb (2000:33) suggests "entrepreneurship to be embedded in the education system", but I advocate that the whole education system should not be carried out entrepreneurially, it is impossible to create a culture of entrepreneurship and individuals with entrepreneurial mindsets. Therefore, teacher education programs should be redesigned to educate teachers who possess entrepreneurial characters which would help them to perform entrepreneurial teaching.

As Altan (2014:49) stated, to prepare global, creative, risk taking, critically thinking, and entrepreneurial individuals for our futures, education systems should not harm their curiosity, imagination, desire to be different by imposing outdated practices and assess with standardized tests designed for "one size fits all" philosophy. Instead, education should be able to enhance human curiosity and creativity, encourage risk taking, and cultivate the entrepreneurial spirit. Educational organizations at all levels and teachers have a great responsibility of designing curriculum with various learning experiences to stimulate, guide and lead the student brains. And teacher educators have the responsibility to train teachers to able to perform these qualities….This could only be accomplished by an educational system taking individual differences into account and which focuses on performance-based assessment.

From the students' reflections it could easily be deduced that these group of future teachers have developed certain amount of awareness and are able to develop some reflections on enterprising education although they are still not completely ready to

practice it. A climate should be created not for teaching entrepreneurship but a climate for teaching entrepreneurially should be created.

The reason for such a framework is to enable students to be more in charge of themselves and their learning, to accomplish their own objectives, to be inventive, risk takers, finding opportunities and be prepared to adapt to issues in our entangled world and come up with innovative solutions (Seikkula-Leino, 2010). As Altan (2015:49) concludes "We no longer need better test takers who think, act and live the same way. Instead we need individuals who are more creative, innovative, and able to come up with solutions to both present and future concerns of the societies they live in. This could only be accomplished by an educational system taking individual differences into account and which focuses on performance-based assessment". And the way to accomplish this task is through enterprising teachers. Teachers cannot change the whole system directly but surely they can make a great difference which could result in changing the whole system.

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A Novel Hybrid Method for the Financial Time Series Forecasting

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Abstract

In recent years, analyses of financial time series have attracted a lot of attention from researchers and market practitioners. The study on theories and application technology of time series, is the emphasis and difficulty of data mining and big data. Analyzing the implicit fluctuate rules of financial time series is extremely important and significant for investors to make market operating strategies. However, due to the high complex and nonlinear characteristics of financial time series, the complexity reduction, proper feature extraction, feature selection and

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effective classifier construction become particularly important. For the sake of this purpose, this paper presents a methodology to predict stock price series based on the Empirical Mode Decomposition, novel feature extraction, Least Absolute Shrinkage and Selection Operator and Gene Expression Programming. The achieved accuracy of the proposed methodology is 89.56% in the training set and 87.09% in the testing set with the 10-fold cross validation. Simulation results revealed that the methodology presented in this paper not only provides effective and feasible path for forecasting of financial time series, but also gives a complete program and valuable reference for other similar studies based on time series data analysis.

1. Introduction

Time series forecasting is widely studied in economic areas with the purpose of developing informed and accurate investment strategies and avoiding potential losses [1-5]. The analysis model of financial time series data, which is important for market traders, developed rapidly in the 1990s, and now is widely used in the theory of financial market microstructure and the empirical test. Wei Huang et al. investigated the predictability of financial movement direction with SVM, and the result shows that SVM outperforms the other classification methods, such as Linear Discriminant Analysis, Quadratic Discriminant Analysis and Elman Back propagation Neural Networks [6]. Myoung-Jong Kim et al. demonstrated the use of a Genetic Algorithm-based method, which combines the classifiers, to predict the Korean stock price index [7]. S A Hamid and Z Lqbal used the neural networks for

forecasting volatility of the S&P 500 index [8]. P Masset proposed a kind of frequency domain method, Wavelet, to analyze financial time series [9]. Because the selection of an appropriate set of features is crucial to improve forecasting accuracy of machine learning technologies, A M Silva et al proposed a systematic way for generating features using a kind of context-less grammar [10]. P Das et al. analyzed the classification of ForEX (foreign exchange rates) series based on Lyapunov exponents, which have the ability to improve understanding of the highly complex and nonlinear system [11]. J Xia et al. applied the multiscale entropy (MSE) and multiscale time irreversibility (MSTI) methodologies to the analysis of financial time series, and the results showed that both methods have the capability of distinguishing different series in a reliable manner [12].

Nevertheless, the intrinsic complexities of the financial time series produce unreliable results using the common time domain tools. Normally, the financial time series are determined by the traders, who operate the account at different frequencies. In stock markets, there are two kinds of frequency traders within the time domain framework: one is the institutional investors (low frequency traders), and the other one is speculators and high frequency traders. As a result of their interaction in the markets, stock market prices can be influenced by different category traders with different frequencies. Therefore, some appealing events may remain hidden under different frequencies when stock prices are analyzed within the time domain framework.

The method for the analysis model grows up with the development of information technology. For the high complex and nonlinear time series data, in 1998, Huang et al, proposed an adaptive method for smooth processing for signals, which was named as empirical mode decomposition (EMD) [13-15]. As a nonlinear and non-stationary tool, EMD gradually decomposes fluctuations or trends into several components called intrinsic mode functions (IMFs), where the important characteristic information of the original time series is reserved and made clear at different time scales. As a simple but effective method, EMD has been used in a large variety of applications, also including the stock market data time series analysis.

In the analysis of the financial time series data, EMD has been used to reveal hidden characteristics and rules. H Lei et al. used the EMD for processing financial time series with high frequency, and then the forecasting model was constructed by using IMFs [16]. M R Islam used the Multivariate EMD (MEMD) for the multiband representation of multichannel financial time series together, then the ARMA (Autoregressive Moving Average) is obtained to predict individual IMFs. After that, all the predicted sub-band sequences are summed altogether to get the overall prediction [17]. Zhang et al. (2008) used the Empirical Mode Decomposition (EMD) to unravel the price characteristics of crude oil at different frequencies [18]. A hybrid method, EMD-PSO-SVM was used in the prediction of gold price time series. In this method, EMD is used to decompose the original series into IMFs, then SVM is used to predict each IMF. Meanwhile, PSO (Particle

Swarm Optimization) was applied to optimize the parameters of SVM [19]. Zhu et al. (2015) analyzed price formation in the carbon markets by using the EMD [20]. A M Jaber proposed a two-stage method, which combined the EMD and LLQ (Local Linear Quantile) to forecasting the daily closing price of stock markets [21]. Nevertheless, in 2010, Bjoern Krollner et al. surveyed the literature (altogether 46 papers) in the domain of machine learning and artificial intelligence methods used to forecast stock markets. They found that, for the consideration of forecasting intervals, the prediction periods are categorized into one-day, one-week, and one-month predictions. Most papers (31 papers totally) make one-day predictions (only 6 papers make one-week and/or one-month predictions). They did point out that it is unnecessary for the investor to take advantage of one-day ahead stock prediction information in terms of trading profit [22]. Furthermore, the related domestic and foreign literatures show that the EMD analysis has been widely used in the financial time series, but most of them are the signal decomposition and reconstruction methods. The truth is, the features extraction and selection is the important part of machine learning and data mining-based problem solving. It is worthwhile to extract the key features in the original time series and the related IMFs for the construction of an effective forecasting model. Therefore, in this paper, a forecasting of financial time series has been conducted using EMD for the Shanghai Stock Exchange Composite Index, covering the total 16 years (from January 1, 2000, to December 31, 2015). EMD is used to decompose the original data into isolated IMFs. After decomposition, several features-extraction methods are presented to extract key characteristics in the

selected IMFs. Currently, due to the rapid growth of big data, the problem of dimensional disaster is becoming more and more prominent, and the collection of many predictors offers new challenges for developing advanced variable selection methods. In this paper, the LASSO method is used to features selection before classification [23-24]. Then, for the classification, Gene Expression Programming algorithm [25-27] is used to construct the classifiers, which are also compared with two other classical classification methods, SVM [28-29] and decision trees [30-31]. Simulation results revealed that the methodology presented in this paper not only provides an effective and feasible path for forecasting financial time series, but also gives a complete program and valuable reference for other similar studies based on time series data analysis.

The remainder of this paper is organized as follows: in Section 2, the detailed construction method of data set is introduced. Section 3 presents a brief introduction of the methodology, and the method of EMD,, feature extraction, LASSO as well as the classification methods. In Section 4, experimental verification is presented and discussed. The last section is the conclusion and future research topics.

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2. Data set

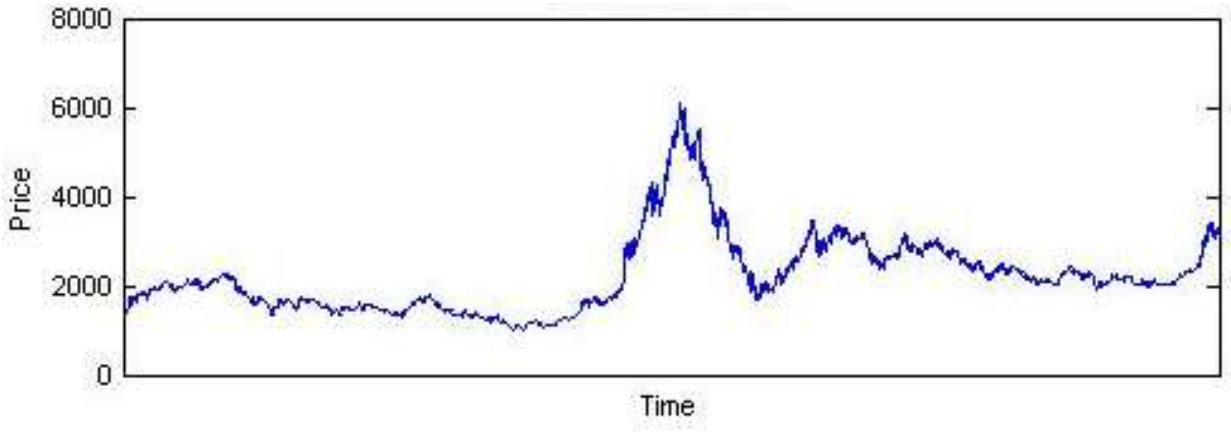

Fig.1. the daily data of the Shanghai Stock Exchange Composite Index

Here total 16 years of Shanghai Stock Exchange Composite Index, from January 1, 2000, to December 31, 2015, are selected as the original times series data (include 3633 data points totally). Then the data set is constructed with the following strategy.

Generally, the data set is extracted from the original time series, which means that each data record in the set is part of the original time series. Every data record is composed of two fixed sub-sequences, head and tail. The H and T are marked as the length of head and tail respectively. The head sequence is used for features extraction for training and testing, and the tail sequence is used to build the class label. Suppose the data record is $x(t)$, $0 \le t < H+T$ and $H \ge T$. The class label is calculated as follows.

$$\begin{cases} 0, if \sum_{t=H-T}^{H-1} x(t) \le \sum_{t=H}^{H+T-1} x(t); \\ 1, else. \end{cases} \quad (1)$$

According to the above formula, there are two classes in the forecasting financial time series, one is the **downtrend** (0 in the formula) in the forthcoming *T* trading days, and the other one is the **uptrend** in the forthcoming *T* trading days. The defining of downtrend and uptrend are two relative concepts which are compared with the nearest and past *T* trading days.

3. Methodology

After the data set construction, the following steps for financial time series includes EMD decomposition, features extraction, feature selection and classifier model construction for forecasting (classification). The whole framework is showed in Fig.2. In this paper, EMD methods are used to deal with the data record in data set, then the original data record transformed into a group of different frequency scales. After the EMD decomposition, features extraction methods are presented to extract important characteristics in the different frequency scales. After feature extraction, with the aim of discovering relevant variables, the LASSO method is used to identify variables of large linear effect. Then, three classification methods, which are Gene Expression Programming (GEP), Support Vector Machine (SVM) and decision tree, are used to construct the classifier model for the financial time series forecasting respectively. The effect of the methodology is verified in the section of experiments. The concrete methods are described clearly as follows.

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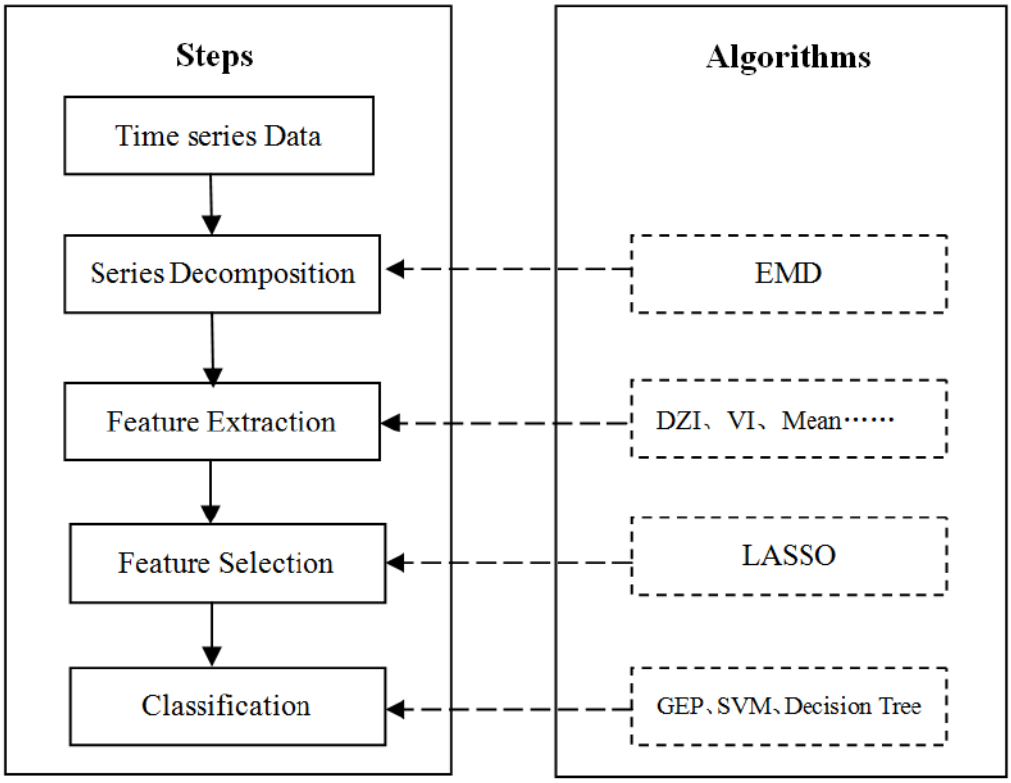

Fig.2. the framework of presented methodology

3.1 Empirical Mode Decomposition

As mentioned before, EMD method decomposes the original into a series of IMFs, but each IMF has to meet the following two specifications [13]:

(1) In the entire data sequence, the number of extreme values and the number of zero crossing points must be the same, or not more than 1.

(2) At any moment, the average of those points, which is defined as the signal of local maximum on the upper envelope and minimum on the lower envelop, is zero.

For a fixed length data record $x(t)$ mentioned before, $0 \le t < H + T$, the concrete EMD processing can be summarized as follows.

Step 1: Finding all the maximums of the $x(t)$, then the upper envelope $e_{max}(t)$, could be fitted with the cubic spline function. Similarly, finding all the minimums of the $x(t)$, then the lower envelope $e_{min}(t)$, could be fitted with the cubic spline function. After that, the mean curve of the envelope, denoted by $m(t)$ can be calculated with the following formula.

$$m(t) = \frac{e_{\max}(t) + e_{\min}(t)}{2} \qquad (2)$$

Step 2: A new data sequence can be calculated with the $h(t) = x_i(t)$ - $m(t)$, and detecting whether the $h(t)$ is an IMF.

Step 3: If $h(t)$ is an IMF, assigning the $c_i(t)$ to be a basic IMF by $c_i(t) = h(t)$.

Step 4: Repeat the process with the residual signal $x_{(i+1)}(t) = x_i(t)$ - $h(t)$, and **Step 1-3**, until residual information $x_{(i+1)}$ can't be decomposed any more (the $x_{(i+1)}$ is less significant to study or a monotone function).

After the decomposition stops, the original signal $x(t)$ is defined as the sum of N IMFs and residual term $r(t) = x_{(i+1)}$. Theoretically, the original signal could be reconstructed by the following function.

$$x(t) = \sum_{i=1}^{N} c_i(t) + r(t) \qquad (3)$$

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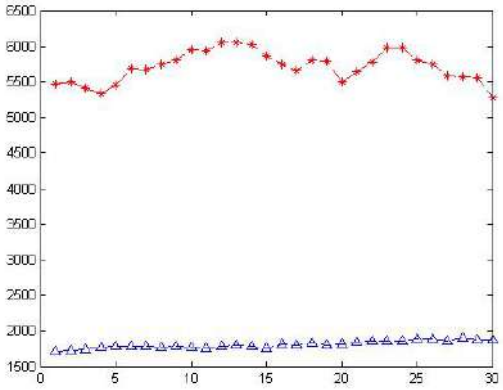
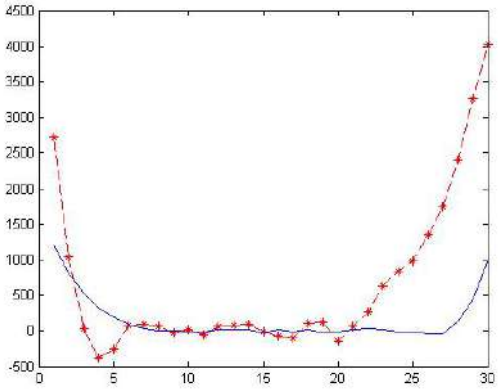
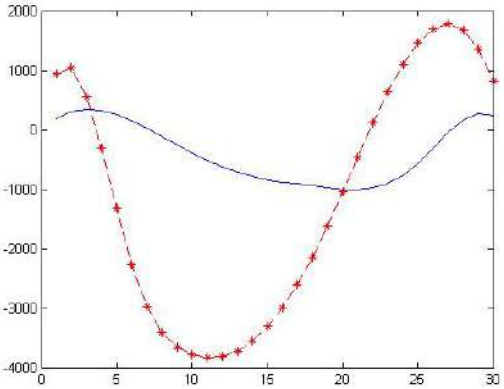


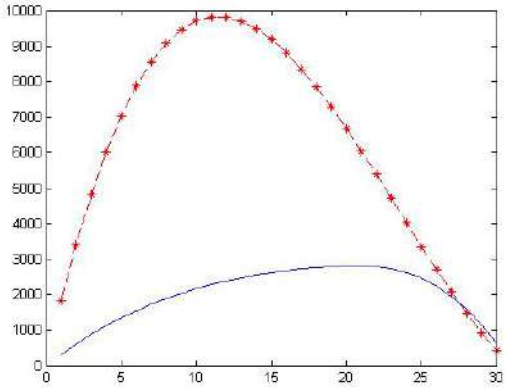
(1) The original comparison A



(2) IMF 1 of comparison A

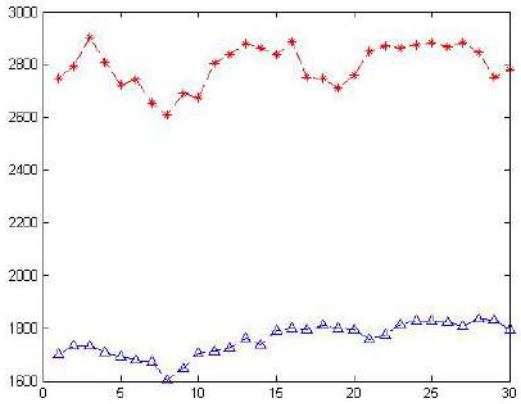


(3) IMF 2 of comparison A

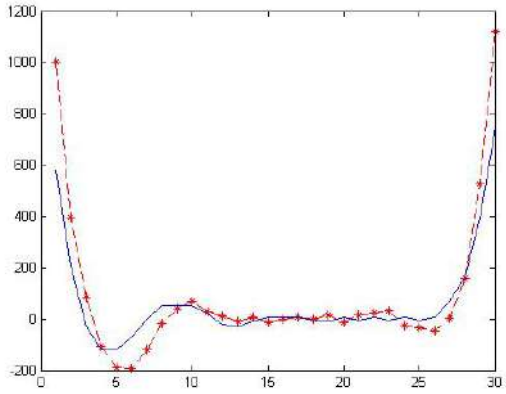


(4) Trend component of comparison A

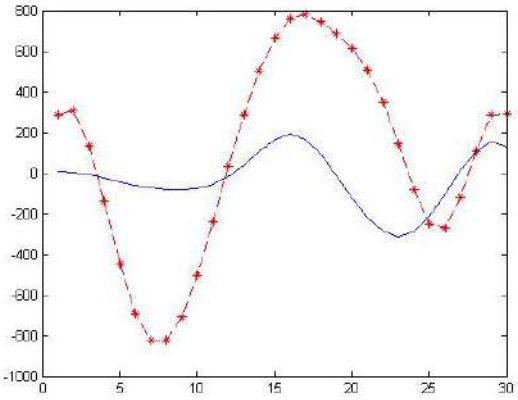
a. comparison group data A



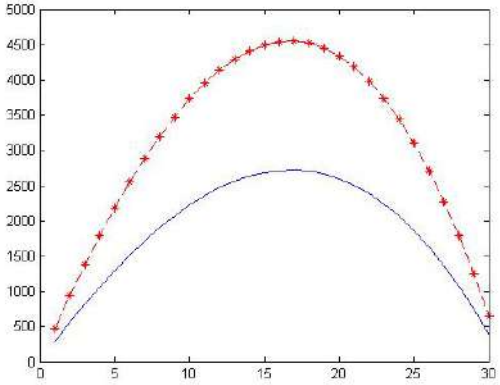
(1) The original comparison B



(2) IMF 1 of comparison B



(3) IMF 2 of comparison B



(4) Trend component of comparison B

b. comparison group data B

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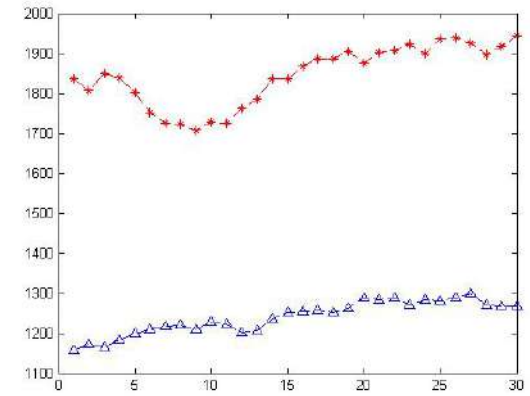
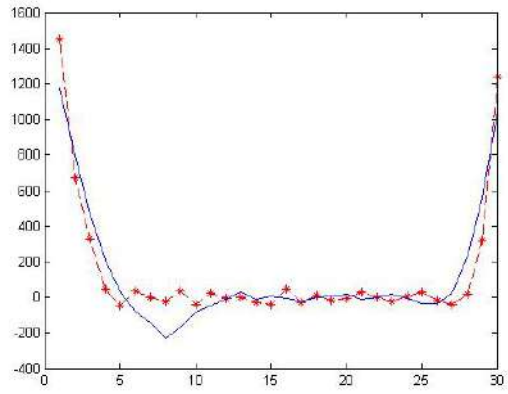
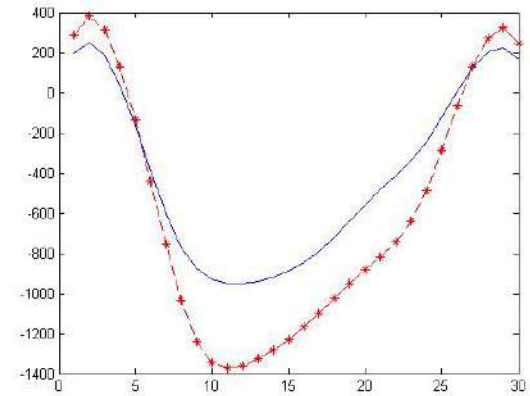


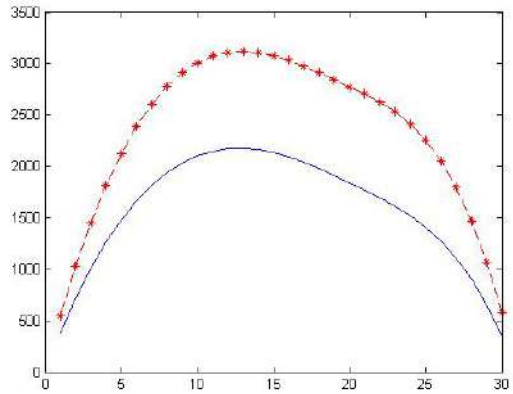
(1) The original comparison C



(2) IMF 1 of comparison C



(3) IMF 2 of comparison C



(4) Trend component of comparison C

c. comparison group data C

Fig.3. three comparison group data A, B, C and different components after EMD

Here we selected three comparison groups of data, A, B, and C, to demonstrate the function of the EMD in Fig.3. The original comparison time-series data are listed in the first row of Fig.3. We find that in each set of comparison data, two kinds of

classes are drawn, which are uptrend and downtrend. The IMF1, IMF2 and the trend component are displayed in the following respectively.

3.2 Feature Extraction

Based on the observation and analysis of comparison data, we found that, after EMD decomposition, the difference between uptrend and downtrend are clearly shown in the IMF2 and trend component data. Our findings coincide with those of another researcher who used similar assumptions. In 2016, K T Aviral et al. used the EMD method to decompose the S&P stock price index into IMFs and residual. Then they found that, compared with other IMFs, low frequency and residual components are relatively important drivers of the S&P 500 index [8]). In the IMF2, the red star dotted line has a relatively high frequency oscillation and fluctuation. By comparison, the solid blue line is relatively stable. In the trend component, the red star dotted line and the solid blue line have the same trend of development. But the red star dotted lines (downtrend) have the larger amplitude compared with the solid blue line (uptrend). Through the above analysis, the proposed method for feature extraction is given below.

(1) Deviation Zero Index (DZI). The DZI formula quantifies the degree of deviation from zero in the IMF2. The deviation is more, the DZI is bigger, and vice versa. The DZI is calculated as follows.

$$DZI = \frac{\sqrt{\sum_{1}^{n}(0 - value_i)^2}}{n} \quad (4)$$

Where n is the data number of sample, and $value_i$ is the ith data in the sample.

(2) Variance of IMF2 (VI). Variance could reflect the volatility of the data, which is a statistic variable to measure the size of data fluctuations.

$$VI = \frac{\sqrt{\sum_{i=1}^{n}(value_i - x)^2}}{n} \quad (5)$$

Where x is the average data of sample.

(3) The Mean Value of Trend Component (Mean).

$$Mean = \frac{\sum_{i=1}^{n} TC\_value_i}{n} \quad (6)$$

(4) The Max Value of Trend Component (Max).

$$Max = Max(TC\_Value_i) \quad (7)$$

(5) The Median Value of Trend Component (Median).

$$Median = Median(TC\_Value_i) \quad (8)$$

After extraction, the size of the feature set extracted from original time series is 5. Combined with the original data (30 data points in each data record), the size of the

feature is 35 totally. Details of the features for the above 6 samples are listed as follows.

Table 1 Comparative calculations for the above six samples.

	A1	A2	B1	B2	C1	C2
DZI	5469.84	1711.51	2747.32	1699.46	1835.6	1157.51
VI	5500.27	1725.52	2794.04	1734.76	1805.5	1171.57
Mean	5407.83	1740.06	2904.09	1731.94	1848.17	1163.88
Max	5338.11	1768.14	2809.31	1706.76	1838.99	1183.31
Median	5461.58	1784.22	2724.4	1690.65	1801.42	1198.81
D1	5683.31	1784.52	2743.16	1680.29	1750.85	1210.32
D2	5678.91	1790.63	2656.04	1671.09	1725.86	1215.85
D3	5742.65	1776.51	2610.81	1602.36	1722.63	1219.81
D4	5798.39	1787.7	2691.21	1646.31	1706.72	1208.77
D5	5950.9	1768.63	2673.55	1704.08	1727.42	1228.16
D6	5934.77	1762.4	2805.61	1713.24	1725.6	1221.11
D7	6056.95	1788.58	2838.86	1724.18	1761.79	1200.26
D8	6057.43	1792.6	2879.62	1761.44	1785.89	1207.53
D9	6031.92	1789.65	2863.81	1736.69	1834.43	1235.08
D10	5869.12	1756.46	2837.5	1788.82	1835.56	1251.41
D11	5742.79	1807.03	2886.11	1797.88	1866.56	1254.78
D12	5660.07	1804.89	2753.9	1793.67	1885.75	1256.01
D13	5804.02	1836.21	2747.95	1810.55	1885.54	1251.27

D14	5794.22	1804.37	2711.74	1799.57	1903.53	1263
D15	5498.86	1811.47	2759.88	1795.16	1875.46	1289.45
D16	5641.98	1838.68	2852.44	1756.3	1900.53	1282.12
D17	5769.2	1856.92	2870.93	1775.78	1906.16	1288.97
D18	5984.71	1851.4	2861.81	1816.78	1921.96	1269.54
D19	5978.94	1853.19	2875.77	1826.61	1898.59	1283.78
D20	5812.46	1889.53	2883.76	1826.4	1934.37	1279.63
D21	5748.18	1885.85	2868.01	1822.39	1937.19	1289.14
D22	5593.35	1860.95	2884.59	1807.83	1926.15	1298.5
D23	5565.65	1896.93	2844.65	1835.86	1896.42	1269.4
D24	5559.15	1878.7	2751.02	1829.61	1918.19	1268.11
D25	5276.01	1868.17	2782.99	1794.33	1944.44	1266.65
D26	426.37	112.91	89.26	25.35	155.22	108.17
D27	4233.17	2602.33	2717.15	1908.66	3966.78	1982.21
D28	6199.94	2024.76	3114.95	1861.71	2337.92	1579.13
D29	9821.79	2820.77	4553.77	2722.85	3117.74	2175.37
D30	6860.14	2262.5	3461.57	2069.11	2614.53	1731.42

3.3 Feature Selections Methods

Currently, due to the rapid growth of big data, the problem of dimensional disaster is becoming more and more prominent, and the collection of many predictors offers new challenges for developing advanced variable selection methods. In practice, the stepwise selection method requires arbitrary definitions of thresholds

that are used to decide which variables to include or exclude from the model. Instead, penalized regression models from the field of machine learning are more flexible than conventional statistical regression methods and have been proposed to deal with data sets involving many covariates. The Least Absolute Shrinkage and Selection Operator (LASSO) [23-24] model is one such model, and has been developed to overcome the limitations when there are many predictors analyzed. LASSO is a regression analysis method that performs both variable selection and regularization in order to enhance the prediction accuracy and interpretability of the statistical model it produces. It was introduced by Robert Tibshirani in 1996 based on Leo Breiman's Nonnegative Garrote [23]. LASSO minimizes the residual sum of squares subject to the sum of the absolute value of the coefficients being less than a constant. Actually, it's because of the nature of this constraint it tends to produce some coefficients that are exactly zero and hence gives interpretable models.

Consider the usual regression situation: we have data (x_i, y_i) where $i = 1, 2, \ldots N$, $x_i = (x_{i1}, \ldots, x_{ip})^T$ and y_i are the regressors and response for the observation. The ordinary least squares (OLS) estimates are obtained by minimizing the residual squared error. Letting $\hat{\beta} = (\hat{\beta}_1, \ldots, \hat{\beta}_p)^T$, the LASSO estimate $(\hat{\alpha}, \hat{\beta})$ is defined as follows,

$$(\hat{\alpha}, \hat{\beta}) = \arg\min \left\{ \sum_{i=1}^{N} (y_i - \alpha - \sum_j \beta_j x_{ij}) \right\} \qquad (9)$$

Where $\sum_j |\beta_j| \le t$ and $t \ge 0$ which is a tuning parameter. For all t, the solution for α is $\hat{\alpha} = \bar{y}$. Assume without loss of generality that $\bar{y} = 0$ and hence omit α. The parameter $t > 0$ controls the amount of shrinkage that is applied to the estimation. The role of it is to shrink the coefficients $\hat{\beta}_j$ forcing some to be zero and thus embedding variable selection. The actual sparsity level corresponding to the size of t is usually chosen via cross-validation, which is also defined in $L^p - norm$, p=1 by

$$\hat{\beta} = \arg\min\left\{\sum_j^N (y_i - \sum_j \beta_j x_{ij})^2 + \lambda \sum_j \beta_j\right\} \qquad (10)$$

3.4 Classification Methods

After the features extraction, training the best classifier model assists us to predict market behavior in the future five trading days, downtrend or uptrend? Three typical classification methods, which are Gene Expression Programming (GEP), Support Vector Machine (SVM) and decision tree, are used to construct the classifier model for the financial time series forecasting. The details of three methods as introduced as follows.

A. GEP

GEP is an evolutionary algorithm method presented by Ferreira in 2001[25], which is an automatic programming technique that utilizes the advantages of GA and GP, but overcomes their disadvantages, such as code bloat.

Like the GA method, GEP uses characteristic linear chromosomes, which are composed of two parts, head and tail. The head is organized with the genes selected from the functions set and terminals set, and the genes in the tail are selected from the terminals set. In order to maintain the validity of the chromosome in GEP (in other words, to allow any gene in the chromosome to be transformed into a valid K-Expression), the size of the tail (t) is calculated by the $t= h(n\text{-}1)+1$,where the h is the size of the head (h is pre-determined by the user according to the problem solving requirements), and the n is the maximum number of parameters required in the functions set.

Suppose the functions set {+, -, *}, and the terminals set is {A, B, C}. It is obviously n =2. One sample of genotype is given as follows (h=5, t=6).

+-*A***CABACB**

When the representation of each gene is given, the genotype of the chromosome is established. The genotype can be converted into the phenotype expression tree (ET) with the decoding method. Thus, the ET of the genotype is showed as follows.

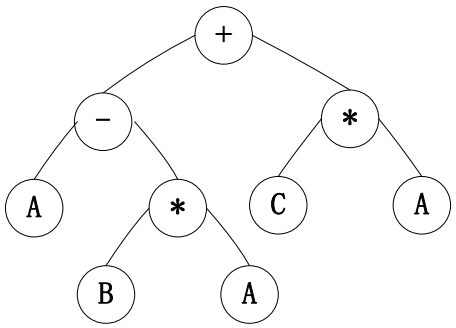


Fig.4. ET of the sample genotype

It can note that the segment of the tail CB does not appear in the ET. The genes in the head or tail do not necessarily need to appear in the tree, which is defined by the GEP. This mechanism can increase the diversity of the chromosome without losing the good individuals, and furthermore, increase the mutation rate without genetic drift. That is the reason GEP may be more powerful than neural networks and other machine learning techniques [25].

The paradigm of GEP defines a set of genetic operators, such as mutation, transposition, root transposition, gene transposition, gene recombination, one-point recombination and two-point recombination, to dual representation of individuals adaptively. The detailed genetic operators and flowchart of GEP can see [26-27]. For the classification problem, the above phenotype can changed in to a classifier, which is a discriminant function defined as follows.

$$f(x) = \left(A - B * A\right) + C * A \qquad (11)$$

In this work, a binary classifier algorithm based on GEP is used for classifier, and the fitness function is defined as follows:

$$fitness = consig * \exp\left(compl - 1\right)$$

$$consig = \left(\frac{p}{p+n} - \frac{P}{P+N}\right) * \frac{P+N}{N} \qquad (12)$$

$$compl = \frac{p}{P}$$

P and *N* are the total numbers of **uptrend** and **downtrend** points in the data set respectively. Furthermore, the *p* and *n* are the correct number of *P* and *N* in the obtained discriminant function $f(x)$ respectively.

The parameters setting in the GEP method are listed in the Table 2.

Table 2 the parameters setting in the GEP method.

Parameters	**Value**
Functions set	+, -, *, /, *sqrt*, x^2, *sin*, *cos*, *tan*
Terminals set	All of the extracted features
Population size	50
The maximum generation	500
The probability of mutation	0.04
The probability of one-point recombination	0.3
The probability of two-point recombination	0.3
The probability of gene recombination	0.1
The probability of transposition	0.1

The probability of root transposition	0.1
The probability of gene transposition	0.1

B. SVM

Support Vector Machine (SVM) is a widely used classification method which is based on the concept of decision planes that define decision boundaries. A decision plane is one that separates between a set of objects having different class memberships [28-29].

Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier. To solve the problem in which the data are not linearly separable, the hinge loss function is adopted which is as follows,

$$\max(0,1-y_i(\vec{w}\bullet\vec{x}_i-b)) \qquad (13)$$

Then, the objective function is to minimize

$$[\frac{1}{n}\sum_{i=1}^{n}\max(0,1-y_i(\vec{w}\bullet\vec{x}-b))]+\lambda\|\vec{w}\|^2 \qquad (14)$$

where the y_i are either 1 or -1, each indicating the class to which the point $\vec{x}_i$ belongs. Each $\vec{x}_i$ is a p-dimensional real vector, the parameter λ determines the

tradeoff between increasing the margin-size and ensuring that the $\vec{x}_i$ lie on the correct side of the margin.

C. Decision Tree

Decision tree learning uses a decision tree (as a predictive model) to go from observations an item (represented in the branches) to conclusions about the item's target value. It is one of the predictive modeling approaches used in statistics, data mining and machine learning. Tree models where the target variable can take a discrete set of values are called classification trees; in these tree structures, leaves represent class labels and branches represent conjunctions of features that lead to those class labels. Decision trees where the target variable can take continuous values are called regression trees.

In decision tree learning, ID3 (Iterative Dichotomiser 3) is an algorithm invented by Ross Quinlan [30-31] used to generate a decision tree from a dataset. In this paper, ID3 algorithm is used to regression trees for classification.

Entropy $H(S)$ is a measure of the amount of uncertainty in the data set S:

$$H(S) = \sum_{x \in X} - p(x) \log_2 p(x) \qquad (15)$$

where S is the current set for which entropy is being calculated, X is set of classes in S, $p(x)$ is the proportion of the number of elements in class x to the number of elements in set S.

$IG(A)$ (Information Gain) is the measure of the difference in entropy from before to after the set S is split on an attribute A. In other words, how much uncertainty in S was reduced after splitting set S on attribute A:

$$IG(A,S) = H(s) - \sum_{t \in T} p(t)H(t) \qquad (16)$$

Where, $H(s)$ is Entropy of set S, T is the subsets created from splitting set S by attribute A such that $S = \bigcup_{t \in T} t$, $p(t)$ is the proportion of the number of elements in t to the number of elements in set S, and $H(t)$ is entropy of subset t.

4. Experiment Verification

For the experiment verification, 600 data records are selected as the data set. Furthermore, 400 data records are selected as the training set and the rest is the testing set. In order to verify the performance of the GEP, two classical methods, SVM and decision tree are used.

The obtained results can be described in terms of accuracy (AC), sensitivity (SE) and specificity (SP). AC, SE and SP are given by the following equations.

$$AC = \frac{TP + TN}{TP + TN + FP + FN}$$

$$SE = \frac{TP}{TP + FN} \qquad (11)$$

$$SP = \frac{TN}{TN + FP}$$

Where TP, FP, TN and FN are defined as true positive, false positive, true negative and false negative events detected respectively.

Generally speaking, the performance of the classification places much weight on the selection of training set and testing set. In order to improve the reliability of the evaluation results, K- fold cross validation is widely used [32]. It is confirmed that the K equals 10 can achieve a better effect on the basis of cost savings. For this reason, the rest of the experiment is carried out with the 10-fold cross validation. Meanwhile, in order to meet the enterprise's actual demand, the parameters and the accuracy for different classification algorithms are fully studied in the following section. Two experiments are carried out, one is the parameters study, and the other one is methods comparison.

4.1 Parameters Study

Two parameters, *H* and *T*, are involved for the best parameters study. As mentioned before, *H* is the length of the time window (what has already happened) for the features extraction, and the *T* is the length of the forecasting time window. In the problem of financial time series forecasting, we found that too long or too short a time window is unrealistic for problem solving. But what are the best optimal parameters of *H* and *T*? Here we construct an experiment for the study of *H* and *T*. *H* is selected from the set {10, 15, 20, 30, 40} and *T* is selected from the set {3, 5, 10, 15}. The GEP method is used as the classification method.

Table 3 the accuracy of the testing set in different combination of *H* and *T*.

H \ ***T***	**3**	**5**	**10**	**15**
10	90.01%	76.57%	53.61%	—
15	90.22%	87.09%	73.14%	70.32%

20	87.23%	85.57%	72.95%	67.46%
30	82.78%	75.62%	70.19%	60.27%
40	74.28%	70.01%	62.45%	54.70%

As shown in Table 3, we found that H=10, T=3, and H=15, T=3 are the two best optimal parameters for problem solving. However, it does not meet practical needs. Because there is no doubt that T=1 will get the best accuracy. For this reason, a new performance calculation method is presented, which is described as follows.

$$performance = T * (accuracy - 0.65) \quad (12)$$

The above formula shows that performance is determined by two important factors, the length of the data record T, and the accuracy. For the length of T, the longer the better, and the length of H will not be considered. Another factor is the limitation of the minimum accuracy constraint. Thus, according to the formula 12, performance for the different combinations of H and T can be transformed as follows.

Table 4 the performance of the testing set in different combinations of *H* and *T*.

H \ ***T***	**3**	**5**	**10**	**15**
10	0.7503	0.5785	-1.1390	—
15	0.7566	1.1195	0.8140	0.7980
20	0.6609	1.0285	0.7950	0.3690
30	0.5334	0.5310	0.5190	-0.7095
40	0.2784	0.2505	-0.2550	-1.5450

Table 4 shows that *H*=15, *T*=5 is the best optimal parameter for the data set for forecasting financial time series. In the following experiment, *H*=15, *T*=5 are set as the fixed parameters for the methods comparison, GEP, SVM and decision tree.

4.2 Methods Comparison

The training and testing results of dataset in 10-fold cross validation by GEP, SVM and decision tree are summarized in the following tables.

Table 5 the results of the training and testing set obtained by GEP, SVM and decision tree.

	GEP		**SVM**		**decision tree**	
	Training	Testing	Training	Testing	Training	Testing
AC	89.56%	87.09%	82.73%	80.29%	68.23%	63.73%

SE	84.42 %	81.27 %	77.91 %	74.06 %	70.85%	59.06%
SP	80.23 %	79.41 %	76.72 %	71.98 %	67.24%	55.31%

Table 5 shows that the accuracy of the GEP classifier are 89.56% and 87.09% with the proposed features in the training data and testing data respectively. Furthermore, within the same training and testing set, the SVM method with radial basis function kernel ($\sigma = 2.4$) and the decision tree with entropy are used to compare with GEP classification method. For accuracy, Multi GP obtains better performance than SVM in AC, SE and SP. The results of experiments confirm that the GEP method improves the forecasting of financial time series with higher performance compared with the SVM and decision tree.

In order to verify the effective of the features selection by LASSO, one additional experiment is carried out. As mentioned before, the GEP is the best classification method for the problem solving in this paper, the experiments are carried out with two conditions, GEP with LASSO, and the GEP without LASSO. The results are showed in the Table 6. Similarly, the training and testing results of dataset are obtained in 10-fold cross validation.

Table 6 the results of the training and testing set obtained by GEP with LASSO and GEP without LASSO.

	GEP with LASSO		**GEP without LASSO**	
	Training	Testing	Training	Testing
AC	89.56%	87.09%	86.84%	84.98%
SE	84.42%	81.27%	79.75%	76.19%
SP	80.23%	79.41%	77.55%	76.02%

According to the Table 6, we can find that GEP with LASSO will averagely raise 2 percentage points in the AC SE and SP either on the training set or on the test set, which means that the LASSO used for features selection is useful for increase the efficiency of classification.

5. Conclusion

The financial time series shows a high degree of nonlinearity and uncertainty, and it is hardly surprising that the difficulty in forecasting market behavior has attracted significant attention. In this paper, the daily data of the Shanghai Stock Exchange Composite Index was chosen to study. As a nonlinear and non-stationary signal

processing tool, the EMD method is used to decompose the financial time series into a number of IMFs and residuals. The EMD method can decompose the data into several layers from which we can analyze the characteristics of each component to get more acute forecasting results. Then, some feature extraction methods are presented to obtain the key features in the segment of the sequence. After features extraction, the LASSO is used to feature selection. After that, three typical methods, GEP, SVM and decision tree are used to establish the classifiers. The result shows that the performance is significantly improved by the GEP method. The method presented in this paper has practical value, and can be promoted to other related financial areas.

In spite of the success achieved by the proposed approach, more work is required. For example, one future project should consider other sources of information about the Shanghai Stock Exchange Composite Index. The financial time series is a very complex problem, which is influenced by multiple factors and variables. The methodology presented in this paper can be useful for solving multivariable time series, but needs future experiment verification.

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