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Regional Strategic Planning using Fuzzy Cognitive Maps

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In Pardubice

Lynnette Eyram Penni

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ANOTACE

V tomto výzkumu jsou použity fuzzy kognitivní mapy (FCM) k simulaci strategických cílů Programu rozvoje venkova. FCM vytváří modely jako množinu konceptů a kauzálních vztahů mezi těmito koncepty. Scénáře navržené expertem organizace jsou zkoumány pomocí simulací FCM, tedy návrhem a implementací FCM pro Program rozvoje venkova jako současného přístupu k regionálnímu strategickému plánování. Vychází z přístupů k regionálnímu strategickému plánování pro Ghanu v oblasti rozvoje venkova. Rozhovory s expertem Programu rozvoje venkova v obci Hohoe v oblasti Volta a výsledky simulace jasně identifikují klíčové koncepty jako hlavní hnací síly v ekonomickém rozvoji a vytyčují řadu doporučení a politické implikace tohoto výzkumu. Těmito koncepty jsou: Učení mládeže, Podnikatelské poradenství a Dostupnost financování.

KLÍČOVÁ SLOVA

fuzzy kognitivní mapy, regionální strategické plánování, Program rozvoje venkova

NÁZEV

Regionální strategické plánování pomocí fuzzy kognitivních map

ANNOTATION

In this research, the use of Fuzzy cognitive map (FCM) is adopted to simulate the strategic goals of the Rural Enterprise Development Program (REP). FCM creates models as collection of concepts and the various casual relationships that exist between these concepts. The scenarios proposed by the Expert of the organization is being examined dynamically through simulations using this FCM hence the design and implementation of FCM for REP and their current approaches to regional strategic planning. Drawing on approaches to regional strategic planning in Ghana in the field of rural enterprise development. Interviews with the Expert of the REP in the Hohoe Municipal Assembly of the Volta Region and simulation results clearly identifies and argues concepts such as Youth in Apprenticeship, Business Counselling and Access to Rural Finance as main drivers in the economic development and draws out series of recommendations concerning a wider policy implication of the study.

KEYWORDS

fuzzy cognitive maps, regional strategic planning, Rural Enterprise Development

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List of abbreviations

AFD	Agence Française de Développement,
AGI	Association of Ghana Industries
ASSI	Association of Small Scale Industries
BDS	Business Development Service
CBT	Competency Based Training
CIDA	Canadian International Development Agency
COC	Chamber of Commerce
DANIDA	Danish International Development Agency
FAO	Food and Agriculture Organizations
FCM	Fuzzy Cognitive Maps
GDP	Gross Domestic Product
GTZ	Gesellschaft für Technische Zusammenarbeit
HACCP	Hazard Analysis and Critical Control Point
IFAD	International Fund for Agricultural Development
IFC	International Finance Cooperation
MASLOC	Microfinance and Small Loan Centre
MOTI	Ministry of Trade and Industries
MSEs	Micro Small Enterprises
MSME	Micro Small and Medium Enterprises
NBSSI	National Board for Small Scale Industries
REP	Rural Enterprise Program
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Organization.
USAID	United State Agency for International Development
WB	World Bank
WFP	World Food Program
YAP	Youth in Apprenticeship

1 INTRODUCTION

The strategy for development formation in regions becomes the basis of the country well-being in general and mostly depends on the enterprises production capacity (Veselovsky et al., 2015). The development of a region is a continuous process which can be considered from a point of view of different economic combination and social goals. The ability of a region to create a competitive advantage is the formation of a socio-economic strategy which creates opportunities whereby businesses, authorities and the society will be able to collect, implement and develop those potentials.

In realization of this, there is a substantial consideration of local economic development strategies which mostly aims at creating jobs, promoting and supporting small and medium-sized enterprises, improving the economic context and opportunity of the territory, and the use of business development services as a weapon in the fight against poverty. One of the local economic development initiatives is the encouragement of new enterprises among which Rural Enterprise Development Program (REP) is discussed extensively in this research.

Region development can be defined as the “regime of a regional system functioning which is oriented to the positive dynamics of the quality and level of living parameters, it is provided with the balanced and stable reproduction of potentials (resource, social, ecological, economic potentials) of the territory” (Veselovsky et al., 2015). In the pursuit to achieving national development goals, there is a collective appreciation of the fact that this achievement can only be because of the goals being translated into actions at the sub-national levels and by active involvement of local actors. This in turn brought about transformed attention to strategic planning for local economic development, which is output and impact oriented and linked to regional level policies and budget processes.

Strategic planning process are major tools for regions’ development. Based on participation processes, cities, regions and provinces have carried out and undergone their strategic plans which have driven their later development of their terrains (Terrados et al., 2007). This makes strategic planning very key and instrumental in a regions development. Strategic planning is the exercise of a systematic integrated approach to policy making which considers one of the most challenging – and exciting – exercises an organization can undertake. There is therefore the need to understanding the concept and the approaches to strategic planning. Strategic planning allows an

organization to make fundamental decisions or choices by taking a long-range view of what it hopes to accomplish and how it will do so (Barry, 1997). Without detailed analysis or assessment of an organization's existing structure, staff, resources (financial, human, technical, and material), programs and governance, a strategic plan cannot be built.

The adopted strategies of a chosen organization under the regional policies of Ghana which is the REP of the Volta Region. This effort considers the broad mission and benefit of the Program to the districts enrolled. General conceptual and methodological approaches need to be developed for strategic planning and activities or actions of the firm which is the rural enterprise development.

To help better understand the current strategies of REP, there is the need to employ the use of fuzzy cognitive mapping approach. A fuzzy cognitive map can be made of almost any system or problem. Cognitive maps are qualitative models of a system, consisting of variables and the casual relationships between those variables (Özesmi and Özesmi, 2004). A careful examining of the strategies adopted by this firm using the cognitive maps and the possibilities of their outcomes. This brings us to a more understanding of what strategic planning is.

Strategic planning is the process by which leaders of an organization determine what it intends to be in the future and how it will get there. In other words, they develop a vision for the organization's future and determine the necessary priorities, procedures, and operations (strategies) to achieve that vision (Barry, 1997). Strategic planning may be characterized as a deliberate or a disciplined effort to produce fundamental decisions and actions that shape and guide what an organization does and why (Bryson, 2011). Measurable goals are included which are realistic and attainable, but also challenging; emphasis is on long-term goals and strategies, rather than short term (such as annual) objectives. Strategic planning is ongoing; it is "the process of self-examination, the confrontation of difficult choices, and the establishment of priorities" (Pfeiffer et al., 1985). Strategic planning involves "charting a course that you believe is wise, then adjusting that course as you gain more information and experience" (Bryson, 1988). The concept of strategic planning is not a new concept. It has become an increasing popular tool for most leaders of organizations to be able to assess the organization's performance, forecast, adjust adopted measures and to rate the level of achievement over the past years.

This analysis is also vital because it allows an organization to perceive which of its above aspects it must change to achieve its goals.

1.1 Objective of the Study

The main objective of this research is to develop and apply a model of regional strategic planning using fuzzy cognitive maps.

1.2 Specific Objectives

- To summarize current approaches to regional strategic planning in Ghana;
- Characterize fuzzy cognitive maps and possibilities of their design;
- Propose and apply a model of fuzzy cognitive map based on a questionnaire survey from a chosen organization which is the Rural Enterprise Development;
- Simulate various effects of the regional policy measures.

1.3 Significance of the Study

Many rural area dwellers are mostly affected by poverty in Ghana. This is evident through the standard of living of residents of those areas which is also because of the low developmental projects in those areas. By empowering the rural poor, the government have tried several intervention programs, but little has been achieved over the years. In due of this fact, this research investigates more into the rural enterprise development strategies which holds the key to deducing rural poverty.

The result of this research using the fuzzy cognitive map will therefore help the experts to be able to determine which strategic goals they have to maintain, change or improve to obtaining a better long-term result which improves upon the life standard of living of the people of the region. This will provide policy makers beneficial information on the role rural enterprise strategies play on the growth of the economy. Also, the findings of this research will reveal how strategic planning plays a vital role in the development of a region.

1.4 Limitations of the Study

Data limitations was one of my challenges to the research work. My case study was about the REP in the Volta Region of Ghana. Getting the right person or the expert on providing the information on the main strategies and the level of achievement of those strategies over the year was also a limiting factor.

There was no readily available data online on the information I needed for my simulation. This makes it a bit challenging as I have to make several calls in order to communicate with the expert of the organization. Also, some of the data provided could not be used since it has no relation with the objective of my research.

In the end upon further persuading the adequate information needed to complete my research was provided.

1.5 Organization of the Study

The well-structured research work is based on point by point. With this idea my research work is divided into five parts. The first part talks about the Introduction to the project in general. It went further to explain the objective and the significance of this research work. The second part talks more about the regional strategic planning in Ghana. It broadened the scope by talking about the REP and its strategic goals as a case study.

The third part talks about the methodology employed to achieving the objectives of this research. The type of data collection method, the research questions, the fuzzy cognitive map and the FCMapper software for simulation of the results and the chosen district enrolled under the program were all explained in detail in this part. The fourth part revealed the results obtained from the expert and the results after simulation. A detailed analysis of these results was discussed in this section. The last part covers a summary of the major findings, conclusions and recommendations.

2 REGIONAL STRATEGIC PLANNING IN GHANA

2.1 Strategic Goals of Ghana

During the early years development, efforts have been made by the government of Ghana to address the persistent high levels of rural poverty in an effective manner through series of developmental plans. One of these efforts was supporting the mainstream agricultural production and small and medium scale businesses (SMEs) (Botchie, 2000).

Development of the entire agriculture and rural sector remains the key to significant reduction in poverty and to economic development of the country as a whole. Regional economic development depend largely on the regional strategic planning of a country. Regional economic development is there defined as the application of economic processes and resources that are available to a region that also results in the sustainable development of, and desired economic outcomes for a region and that meet the values and expectation of businesses, of residents and of visitors (Stimson et al, 2006). Understanding the role of a region and the processes of change in a region is very crucial for planning and analysis of regional development.

The Ghana Poverty Reduction Strategy emphasizes a holistic approach to agriculture and rural sector development. Several studies tried comparing the different agriculture intensification paths of Africa and Asia and these are two developing regions which are extensively inhabited by small holding farmers (Mellor, 2014). Support to the small scale enterprises fits into government strategy to ensure that economic activities and operators in the rural space play a significant role. The government of Ghana is constantly searching for more effective ways of assisting SME performance, through various strategic growth and development schemes (Owusu-Frimpong and Martins, 2010).

Agricultural mechanization which also represents technology change through the adoption of non-human sources of power to take on agricultural actions such as ploughing, harvesting, shelling, and planting were also concerns to the government (Diao et al., 2014). Many African countries including Ghana has developed adverse interest in increasing agricultural modernization. Constrictions by the limited area being cultivated because of the man power use either by hand hoe and its associations and the primitive perceptions that come with it has made agriculture modernization to be the long-term vision to Ghana (Houssou et al., 2014).

Ghana has experienced steady economic growth since the late 1980s, and the growth is accompanied by rapid urbanization and rising nonfarm opportunities in the rural areas (Diao et al., 2014). Greater percentage of Ghanaians live in the rural areas and majority of the food that find its way to the urban areas of the country are from these rural areas.

A substantial amount of economic activities in rural areas are small scale enterprises. Therefore, support to small scale enterprises provides a valuable strategic entry point to stimulating the rural economy and increasing incomes of the rural population. This reveals the activities of the REP as strategy to bring development.

It is worth stating at a start that little is known about rural skills and enterprise development intrinsically as most studies and policies concentrate on the sectoral or occupational distribution of skills rather than their spatial location as such (Ceballos-Silva and Lopez-Blanco, 2003). Rural enterprise development is one of the poverty reduction strategies in Ghana. Ghana has enrolled under several programs to boost the growth of the economy in the past years. The government therefore presented “Ghana: Vision 2020,” aimed at making Ghana a middle-income country in 25 years (Sowa, 2002). Their main vision is focused on economic growth, human development urban, development, infrastructure development, rural development and an enabling environment.

This report therefore focuses more on the rural enterprise development and clarifies what is meant by ‘rural’ from the light of the country’s history. It also therefore explores the varied and contested meanings of ‘rurality’ and evaluates the content of relevant policies and assemble evidence and focusing on the strategic goals. Furthermore, this scoping study reports and reflects on comparable strategies found as helpful to shed light on available and accessible Ghanaian evidence on the rural enterprise development which is a program under the United Nations - Food and Agriculture Organizations (FAO), The International Fund for Agricultural Development (IFAD), and the World Food Program (WFP).

Rural can be defined as a fluid and other ways flexible concept that is bound to be redefined due to shifts in the sector composition of local economies, location specific population densities and political-legal policies bearing on spatial boundaries (Jacobs and Hart, 2012).

A useful conceptual approach to make sense of rural skills development is to think of it in terms of skills demand and supply (Jacobs and Hart, 2012). Within each sector, industry and workplace-

whether these are classified as formal or informal, the types and levels of skills demanded and supplied varies.

Agriculture, for example, is modernizing fast and this is evident from its increasing reliance on modern systems of technology development and transfers and innovations. Although traditional agriculture continues to be the mainstay in the rural employment in many parts of Africa, rising shares of non-farm rural employment are rapidly expanding and resulting in a wide variety of occupations (self-employed farmers, artisanal manufacturers, tourism, etc.) and skills levels.

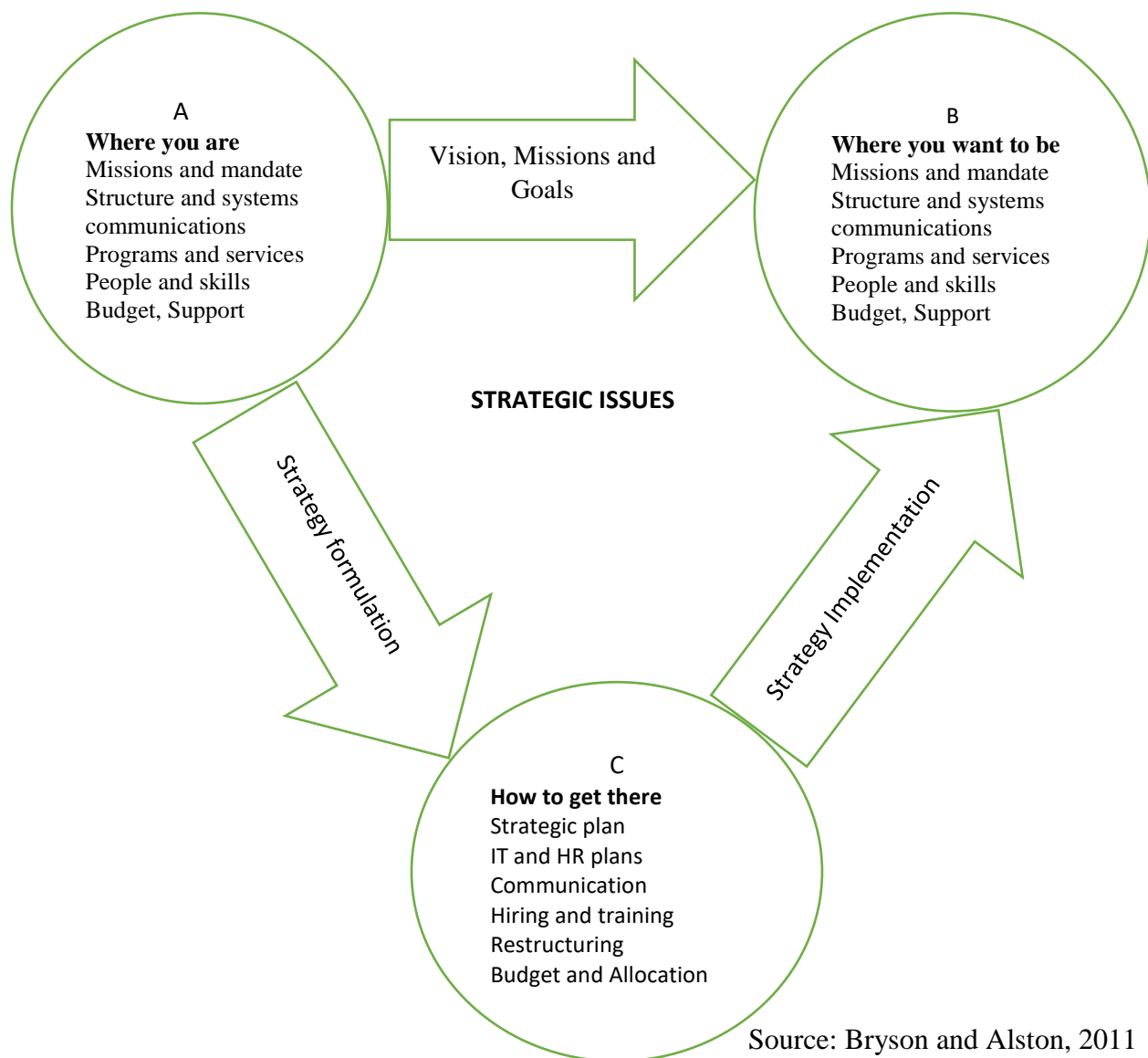
Rural development has a wide view on rural society and its changes. There are various aspects dealing with the rural areas and its societies, which have been changing since long many factors. The main characteristics features of society are based on the changes in economic, social, cultural, religion, believes, attitudinal, organizational, and even political changes, besides the technology alterations. Therefore, rural development is a multifaceted phenomenon and a multi-dimension of rural society and its changes. As a result, rural development has a variety of aspects of the development of rural society, which can be viewed and accordingly, literature on this topic may be reviewed in the following manner.

- The strategic goals of the rural enterprise development in Hohoe Municipality of the Volta Region of Ghana.
- Level of achievement on these goals.
- How to build a fuzzy cognitive map for these goals depending on the relationship that exist among these goals.

Development of rural societies in underdeveloped nations and that of rural societies in developed nations is different in its approach and strategy of development. In developing societies, rural people are socially and deprived economically from many factors. They are not just poor and ignorant but have multiple problems such as poverty, illiteracy, ill-health, unemployment, inequality in income and wealth. These are some of the common phenomenon among rural people, besides lack of infrastructures in the rural areas. Thus, the main aim of rural development is to have an overall development of the rural people as well as of areas providing the infrastructural facilities.

2.2 Strategic Plan

The strategic plan which the Country implore is the implementing of REPs across all regions. This plan helps stakeholders and leaders to determine where to spend time, human capital and money. The strategic plan clearly defines the strategic context of the Program which makes one to understand exactly where they are, identifying what is important, deciding what must be achieved, the people accountable and subsequently reviewing the program. Figure 1 defines the ABCs of strategic planning.



Source: Bryson and Alston, 2011

Figure 1: ABCs of strategic planning.

2.3 Rural Development Program Objectives

Micro Small Enterprises (MSEs) account for about 60 per cent of GDP, with three-quarters of the population deriving their livelihood from this sector. Conditions surrounding the lives of people in rural areas are knowingly below those in urban areas and 80 per cent of people classified as poor as rural dwellers (Bosiakoh et al., 2014).

Barriers encountered by smaller enterprises have been on the heart of a handful of researchers from all over the world, but little is still known about the barriers faced by small African enterprises of which Ghana is not an exception. Recent efforts have been made to better understand this subject in the African context, including research by the Global Entrepreneurship Monitor (Herrington et al., 2010).

Improving the quality of life for all Ghanaians requires a special effort to be made in the field of rural development. To achieve this goal, these objectives are therefore put into consideration (Anríquez and Stamoulis 2007):

- To bridge the gap between rural and urban populations by reducing disparities in incomes and standards of living (Proctor, 2014).
- Promote accelerated development in rural areas with pronounced development potentials.
- Provide essential basic economic and social infrastructure in areas suffering from gross deprivation (Miller, 2013).
- Achieve relative spatial equity, both rural/urban and intra-rural, in the allocation of public investment.
- Ensuring that optimum exploitation of natural resources on a sustainable basis.
- Provide adequate economic and social infrastructure and services in all rural areas to enhance productivity and equality of life (Miller, 2013).
- Ensure that economic activities in rural areas, especially agriculture, forestry and mining, do not cause environmental degradation. Protection the rural environment against coastal erosion desert erosion which are the natural causes of erosion.
- Introduce land-use policies and land management techniques to increase the economic potential of the totality of land and water-based renewable resources, with reference to forestry (Amoateng et al., 2013).

2.4 Business Development Services Component

This aims at upgrading the technical and entrepreneurial skills of the rural-medium scale enterprises by providing access to business development services at the district level. Business development services refer to all financial and non-financial support that an individual farmer or a small- or medium-sized agricultural enterprise needs to small enterprises may need various forms of assistance from outside. These include planning, production, operations and other business operations (Oldsman and Hallberg, 2002). It is believed that supporting small businesses within low-income communities is a plausible development strategy to combat poverty. Relatively little attention has been given to understanding entrepreneurship and small business development. These two components serve as a basis for a comprehensive, rural development strategy for low income, rural communities (Pato and Teixeira, 2016).

Business development services contribute a lot to enterprise development even though it seems to be complicated by the very circumstances it seems to eradicate. Bowers (1989) adds that developing new services improves the process and even makes it better. Old ways of doing businesses are no longer adequate and services which were once popular are no longer in demand. Bhattacharyya (2006) also stated that for the rule of the game to change and add value, businesses need to create something different. It is often achieved by extracting new value from the traditional and linking its emergence to the national values (Anderson, 2000). It is with this concept or this idea that makes the creation of new business development avenues very crucial in rural enterprise development. Business development is an economic development factor which adds to the internal advantages of a region. Several innovation systems are included in the business development services. Innovations that can improve competitive potential in business, innovations that that can promote participatory processes and innovations that will improve life of the people in general (Bagautdinova and Novenkova, 2012). Categories of business development services include those presented in the following subsections.

2.4.1 Technology and Product Development

Technology and product development services support research and identify new and innovative ways to produce, process and market agricultural products. Technology serve as a main component or reference point in product development. The use of IT in innovation and knowledge creation are a firm's long-term success (Kleis et al., 2012). Innovation can take the form of new products, new production processes or methods, new markets or even new sources of supply. This includes new

mobile information systems and improved, drought-resistant seed for example. The concept of innovations has been extensively discussed (De Medeiros et al., 2014). The application of IT contributes to the innovation process through three primary mechanisms. It contributes to the management of knowledge used in innovation production, it enables critical elements of the innovation production process, including opportunity identification, concept development, and innovation design and finally information technology enables the interorganizational coordination between the focal firm and its external innovation partners (Kleis et al., 2012). The effects of technological change on economic growth and development encompass economic dynamics at all spatial scales: national, regional and local (Kline and Moretti, 2013). Technology change can increase productivity also through entrepreneurial skills which create new business and hence new jobs and intensify competition (Acs, 2006).

2.4.2 Training and Technical Assistance

Capacity of farmers and enterprises are being developed by these assistants to better plan and manage their operations and improve their technical expertise from accounting to agronomy. Providers develop and offer sustainable training and technical assistance that producers are willing to pay for, and they foster linkages between other service providers and enterprises (Lusby and Panlibuton, 2007). Small or medium scale farmers already mostly encounter numerous risks to their agricultural production, including pest and disease outbreaks, extreme weather events and market shocks, among others, which often undermine their household food and income security (O'Brien et al., 2004). This is the most reason why training and technical assistance is very necessary.

2.4.3 Input Supply

Input supply services helps farmers improve their access to and use of raw materials and production inputs, such as seeds, fertilizers, agro-chemicals and tools. The facilities linkages between farmers and suppliers and enable suppliers to both expand their outreach to farmers and develop their own capacity to offer better, less expensive inputs (Lusby and Panlibuton, 2007). In describing the agriculture policies of the country, government interventions can be examined through the markets available for input supply. Agriculture policies include government actions which affects the income of rural producers by influencing the prices the encounter in the major markets which determine their income (Bates, 2014).

2.4.4 Market Access

Market access services in the municipality identify and establish new markets for smallholders and agro-enterprises. This is done in order to facilitate the creation of linkages between all actors in each market and enable buyers to expand their outreach to and purchases from rural producers. Market access be identified as a strategic tool for quality decision-making in the SME sector (Mahmoud, 2010). Marketing is important success function for SMEs that is facilitated by market access. They also help entrepreneurs develop new value-added products and meet buyer specifications.

2.4.5 Infrastructure

Infrastructure services create sustainable infrastructure and delivery networks that allow producers to increase production, sales and profitability. Examples include irrigation, refrigeration and storage, processing facilities, transport systems, loading equipment, communication centres, improved ports and expanded road and rail routes (Badu et al., 2013). Difficulty in movement of goods, information and people coupled with individual opportunity, have produced more than thousands incremental improvements to the world's infrastructure portfolio (Miller, 2013).

One major factor impacting upon rural infrastructure development is infrastructural availability and development. From research, it has been observed that the construction of project amenities and post-construction maintenance creates avenues for jobs for the poor and thus raises living standards of the people (Badu et al., 2013). Other factors include construction methods and approach, local resources and stakeholder participation, contract formation and contracting procedures; and environmental sustainability and climate change.

2.4.6 Policy and Advocacy

Policy and advocacy service conduct research and analysis to improve overall terms of trade, strength and sectoral governance and correct any power imbalances. These service providers also identify and seek to reform policies and regulations that constrain smallholder farmers and agro-enterprises, and they facilitate the organization of businesses, donor government officials and academics around inclusive, pro-poor policies.

2.5 The Technology Promotion and Dissemination Component

This component seeks to upgrade the level of technology of the Medium Scale Enterprises sector. It facilitates the promotion and dissemination of applicable technologies in terms of skills training, producing of processing equipment, testing and promotion of prototypes. Science and technology has a vital role to play in the development process. With relevancy economic growth process, the application of science and technology is important for enhancements in the productivity on which all economic growth process final depends. Improvement of social conditions and the environment by providing people with a better understanding of the implications of social and cultural practices is an added advantage.

2.6 The Access to Rural Finance

This component aims to enhance access of rural MSEs to rural finance. Ensuring that farmers have adequate access to financial resources is a key tenet of successful rural development strategies (Fletschner and Kenney, 2014). Several factors have contributed to the rising interest in access to rural finance. Studies have shown that one of the channels in which financial development contribute to the economic growth in countries or regions is mostly revealed by the facilitating process to rural finance (De la Torre et al., 2017).

Expanded access to credit may improve the welfare of its recipients by lowering transaction costs and qualifying information irregularities (Crépon et al., 2015). Financial service providers offer credit to smallholder farmers, producer organizations and agro-entrepreneurs, usually in the form of loans. They also include supplier or buyer credits, warehouse financing, equity financing and venture or private equity capital. Financial inclusion or inclusive financing is the distribution of financial services across at affordable costs to sectors of disadvantaged and low-income segments of society which is measured as rural (ShahulHameedu, 2014). Government efforts are being deepened on the support given by the Rural Financial Services Project.

Farmers who do not have access to loans or insurance, producers who may face negative shocks, such as droughts, illness or a substantial drop in the prices they receive, can lose some of the few assets they do have (Ali et al., 2014). Also, growth opportunities are being limited because of the inability for producers to access financial services which in turn prevents consumption and investments. Considering the Loan Providers, they can either take be “formal” or “informal”. The

‘formal’ providers are for example commercial banks, microfinance institutions and social lenders and “informal” are the savings and loan cooperatives, moneylenders.

As mentioned earlier, IFAD is leading the effort in close collaboration with several international development organizations to deepen the government’s effort in eradicating poverty.

2.7 Organizations of the Poor

When groups and communities are well organized, they are more likely to have their voices heard and their demands met. Once membership-based groups unite or federate at higher levels, they will eventually gain voice and representation in policy dialogue and choices that influence their well-being. Therefore, through this channel of organisation of the poor, they, first and foremost, are provided the chance to build individual and collective capabilities to gain access to economic opportunities and the fundamental social services and infrastructure.

Enhancing the human and social capital base of the rural poor will give them access to interact with those wielding powers on a more equitable and informed basis, and thus negotiate more adequately on issues that affect their well-being.

2.8 Direct Interventions from Development Partners

Various credit schemes activities being concentrated on by many donors. The dynamic role of small and medium scale enterprises in developing countries have been highly emphasized. Due to this fact, a complete approach to strengthening rural and microfinance institutions and small and medium-scale (MSMEs) through training and business support and targeting different tiers of the rural finance system through both commercial banks and micro-finance institutions. A list of projects is presented in Table 1.

Table 1: Donor activities in the area of supporting MSMEs

Donor	Title	Short Description
CIDA	Private Sector Development Support	Assist MSMEs (deepening technological capacity)
DANIDA	Private Sector Programme	Business linkages between Ghana and Denmark
DANIDA	Business Sector Development	Lending to SMEs, front-runner legal reform (pilot)
GTZ	Promotion of Small and Micro Enterprises	Assist MSEs (Credit Fund - Urban and Rural areas)
GTZ	Promotion of Private Sector	Promotes German investments in Ghana
GTZ	Rural Financial Services Project	Capacity building to rural and community banks and informal financial sector; and to ARB Apex Bank
IFAD/AFD	Rural Enterprise Project	Enterprise development in rural areas
IFC	Africa Project Development Facility	Support the development of SMEs (training
UNDP	Ghana Foundation	Assist SMEs (entrepreneurship development)
UNDP	African Management Services Company	Assist SMEs (training and secondment)
UNDP	Micro Start Ghana Programme	Support MFIs build institutional capacity
UNDP	Promoting Private Sector Development	Capacity building of private sector interlocutors
UNIDO	Strengthening competitiveness of MSMEs	Strengthening capabilities of MSMEs
USAID	Micro enterprise Development Assistance	Assist micro and small-scale farmers
USAID	Amex International (increased private enterprise performance)	Support development of nontraditional exports
USAID	Trade and Investment Programme	Assist SMEs in non-traditional exports (credits)
WB	Non-Bank Financial Institutions Assistance	Promote growth of non-bank financial sector

Source: Mensah, 2004

2.9 Strategic Intervention and Instruments

Depending on the missions and policies of the respective organizations specific focus of instruments are used by donors. In spite of focus intervention and instruments used, all attempts aim at boosting the performance of the SME hence improving economic and social conditions. The instruments and interventions which were implemented are summarized in Table 2.

Table 2: Focus of intervention and instruments implemented

Focus of intervention	Instruments
Financial services	
Debt and equity financing	Credit lines to financial institutions
Banking services	Consulting and training for financial institutions
Equipment leasing	Direct investment in small enterprises
Business development services	
Consulting and engineering	Financial support to BDS facilitators/providers
Management and worker training	Consulting and training for BDS providers
Marketing assistance	Product development for BDS providers
Information services	Direct provision of BDS to small enterprises
	Matching grants/vouchers for small enterprises
Government-mediated business environment	
Business regulations	Technical assistance to government agencies
Property rights and contract enforcement	Support for public-private dialogue
Transparency and corruption	Direct advocacy of specific policies
Labor policies	
Trade policies	
Tax policies	

Source: Duncomben and Heeks, 2002

2.10 The Role of Rural Enterprise Development in Regional Strategic Planning

Rural enterprise development has been recognized as a seed-bed for indigenous entrepreneurship; This enterprise as well as the SMEs has been one of the major areas of concern to many policy makers for the reason to accelerating the rate of growth in the Country (Abor and Quartey, 2010). They have been identified as a major growth medium through which the objectives can be achieved. They are also labour intensive, employing more labour per unit of capital than large enterprises in the region.

- Promote indigenous technological know-how;
- Can compete (but behind protective barriers);
- Use mainly local resources, thus have less foreign exchange requirements;
- Cater for the needs of the poor and;
- Adapt easily to customer requirements (flexible specialisation).

3 RESEARCH METHODOLOGY

A critical look on the strategic goals and level of achievement over the years. The main research design adopted was a one-on-one interview with an expert of the rural enterprise development as my respondent and a Cross Sectional Design, with a case study. This is a pragmatic enquiry that allows the researcher to investigate and understand the changing aspects of a system. The comparison of 'before' certain strategies were adopted and 'after' the adoption of those strategies will also be accessed. A result on the weights of each strategic goals will be generated and those weights will be simulated using fuzzy cognitive maps.

3.1 Data Sources and Collection Method

Both primary and secondary sources of data collection will be useful in this research. The primary data intends to produce useful information from the rural enterprise development expert and that will include what the strategic goals are and the level of achievement of those goals. Information on other variables on the program component such as the business development, employment generation, access to micro finance, technology dissemination will be elicited from the chosen district which have been enrolled under the REP. The secondary sources will include records, reports and other documentations.

3.2 Population

The population of the study consists of participants enrolled under REP in the District. Further information from the entrepreneurs and officers from National Board for Small Scale Industries (NBSSI), Ministry of Trade and Industries (MOTI), Association of Small Scale Industries (ASSI), Chamber of Commerce (COC), Association of Ghana Industries (AGI) and Microfinance and Small Loan Centre (MASLOC) was elicited adequately. The target population comprises people who provide SMEs services or support SMEs and some staffs of the District Assembly of the Hohoe Municipal specifically on rural enterprise development.

3.3 Data Collection Tools

The adoption of both quantitative and qualitative research methods shall be employed to facilitate the primary data collection method. Quantitative data refers and resolves problems using numbers where emphasis is laid on the collection of numerical data, the summary of those data and the drawing of inference from those data. And qualitative on the other hand, is based on words and feelings, sounds emotions and other non-numerical and unquantifiable elements. Information is

considered qualitative in nature if it cannot be analysed by means of mathematical techniques (Herbst and Coldwell, 2004). Specifically, on this research, the following methods shall be used.

The questionnaires for this study were designed in two parts. Parts one for the Bio data, this includes information such as of the respondents as the name, sex, age, level of education, position of the respondent in the enterprise and the working experience of the respondents in the enterprise. The second part contained the questions relating to the business background information. The responses for the second part form the basis of the data presentation and analysis.

Questionnaire or a survey is simply a self-administered interview. It requires self-explanatory or understandable instruction and question design from the interviewer to the respondent. This method shall be employed in generating information from the expert of the REP. This will facilitate the gathering of quantitative data on the objectives of the program and the strategies adopted in achieving those objectives. Open ended and close ended questions will be used to respond to the demand of the various variables stated in the analysis. Open ended questions will leave the respondent to freely respond to questions in relatively unrestricted manner while the close-ended questions restrict choice of response in terms of present categories or alternatives.

Interviews shall be conducted to generate qualitative information about the tendencies, heights or levels, achievements and challenges involve in the Program implementation. Structured and semi-structured interviews shall target the staff or the expert from the REP and the offices of some of the corresponding districts under the program.

Another method adopted also is the content analysis technique. Content denotes what is contained and content analysis is the analysis of what is contained in a message. Content analysis may be described as a method where the content of the message forms the basis for drawing inferences and conclusions about the content (Prasad, 2008).

3.4 Research Questions

- What are the regional strategic planning measures in Ghana?
- What is the nature of the rural enterprise development program?
- What are their strategic goals?
- What are the actual implemented activities to achieving these goals?
- What are the level of achievement on these goals?
- What relationship exist among these goals?

- What main concepts are considered the most important?
- What factors can one consider as regional policy maker to help enterprises survival in the region?

3.5 Fuzzy Cognitive Maps

To support readers on the essential knowledge background needed, the necessary theories about the concept proposed are being explained in this section. Introducing the reader to the use of Fuzzy Cognitive Maps (FCMs) as an alternative approach to simulate the existing strategic planning procedures. This section hence suggests that FCMs can be a useful tool to facilitate the strategic planning process of the rural enterprise development and to develop consensus and win commitment of those on whose actions the organization's future depends on. FCMs are mostly proposed and used in participatory planning and management and/or conservational decision-making contexts and are mainly used to gain an understanding of how stakeholders internally construct their understanding of their world or an issue of interest. FCM have been assumed in many ways and, depending on the academic discipline in which it has been applied, used to draw a range of conclusions about the belief systems of individuals and groups.

“Cognitive map is a graphical representation intended to capture the structure of decision maker's stated belief about a particular problem” (Axelrod, 2015). It is also called the mental map or mental model in most cases and it which serves an individual to acquire store code recall and record information about the relative locations.

The introduction of FCMs as an extension of cognitive maps, they are appropriate modelling tools which are usually categorized as a neuro-fuzzy method, and subsequently used for modelling and simulation of dynamic systems. Their ability to incorporate and adapt human knowledge is an advantage over other concepts.

The map is based on defined variables and the relationship between those variables. The expert or the person making the cognitive map, decides which variable are most important which could possibly cause a change to a system and then draws a relationship among these variables indicating the relative strength of the relationships with numbers between 0 and 1. The concepts or the variables are represented by nodes and the causal relationships by directed arcs between the nodes. Each arc is accompanied by a weight that defines the type of causal relation between the two nodes.

Causal relationships link variables to each other and they can be either positive or negative. Variables that cause a change are called *Cause variables* while those that undergo the effect of the change in the cause variable are called *Effect variables*.

Efforts have been made to bridge the gap between quantitative variables and qualitative variables using such soft computing techniques (Beccali et al., 1998). Quantitative variables can be expressed as linguistic variables. This tool is straight forward and simple and it makes it easier for the expert of the decision maker to provide, promptly, the overall qualitative estimation of an organization. An FCM can address coherently qualitative and quantitative variable.

The life-cycle of a FCM consists in this Research is of three significant stages:

- Designing the FCM;
- Running the FCM;
- Simulating scenarios.

Designing the Fuzzy Cognitive Map

There are several ways of designing the FCM but specifically what I used is listed below.

- From questionnaires;
- Through series of interviews conducted by an FCM trained moderator;
- By data-mining, through eliciting information from written texts.

The causal relationship that exist between factors or the concepts is defined following the steps:

- A direct or inverse relation between two factors is identified; it is denoted with an arrow pointing the direction of the relation;
- then, the strength of the relation is described, using linguistic (qualitative) weights, such are: strong positive; positive; weak positive; neutral; weak negative; negative; strong negative;
- the linguistic weights are transformed into fuzzy sets, see Table 3.

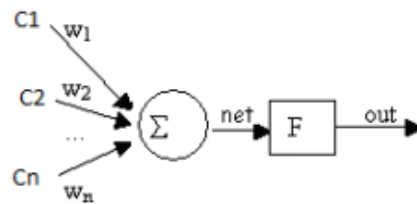
Table 3: Linguistic values transformed to fuzzy values

Linguistic value	Fuzzy value
strong positive	0.9
positive	0.5
weak positive	0.25
neutral	0
weak negative	-0.25
negative	-0.5
strong negative	-0.9

Source: Own data from expert analysis

Running the Fuzzy Cognitive Map

One of the advantages of FCMs is that they can be run until they reach a steady-state, which can be used for predictions, simulations, to obtain a better understanding of the process by people involved, not necessarily specialists. We can relate the running a FCM is a process to training neural networks. An FCM can be considered as a type of recurrent artificial neural network (Tsadiras, 2008). Thus, FCMs evolve over time and can be evaluated in relation to this evolution. The similitudes are perfect: the FCM consist in a set of nodes/concepts with initial values (time $t=0$), the nodes are linked between them with weighted arrows (Alexandra and Lavinia, 2013). Node's output can be computed with a process similar to activating a neuron: if C_1, C_2, \dots, C_n are the concept values of all concepts factors that influence the fixated factor with the weights W_1, W_2, \dots, W_n , then the output of the fixated node is attained by summing the weighted factors and, applying a non-linear transformation (function F , named activation function) to this sum (Figure 2).



Source: Alexandra and Lavinia, 2013

Figure 2: Output of the node in FCM.

The activation of a concept node is the summing operator is the figure above. Realization of it involves multiplying each input causal influence C_i arriving from another concept node i , with the weight or strength, W_i , of the corresponding causal link (Tsadiras, 2008):

$$net = \sum_{i=1}^n in_i w_i, \quad (1)$$

$$out = F(net) = F(\sum_{i=1}^n in_i w_i). \quad (2)$$

The role of the activation function is to limit the amplitude of the output of a node to the interval $[0, 1]$. The sigmoid function with saturation levels 0 and 1 is the most commonly used (Çoban and Seçme, 2005). Sigmoid FCMs are suitable for qualitative and quantitative problems where representation of a degree of increase, a degree of decrease or stability of a concept is required, and strategic planning scenarios are going to be introduced (Tsadiras, 2008):

$$f(x) = \tan h(x) . \quad (3)$$

The activation level can now take any value from the interval $[0,1]$ and so continuous state FCMs are created.

Simulating scenarios

Before a suitable model can be established and goals achieved, several iterations and simulations are involved in the development stage. In case of collective growth, the quality of the final model can be improved by varying impact of a given expert model on the final model based on credibility of an expert. And sometimes additional parameters are required in the development task.

FCM can be used to simulate the progression of the system in time. When the initial state of the system is given, a FCM can evolve over time until it reaches a state of equilibrium (the steady state). This steady state can be used to make forecasts or to test different scenarios: fine modifications of one or several factors in the system will yield to different behaviours in time.

Simulating scenarios of factors of FCMs. This enables the decision maker to “predict the future”, and explain to the beneficiaries such as the District enrolled or directly the people involve why

some decision are relevant and have been taken. In scenario analysis, FCMs indicate the path in which the system will move given certain changes in the driving variables.

FCM is a set of valued concepts and causal relationships: $\{A, C, W\}$, where:

- n is the number of concepts;
- $A = (A_i), i = 1, \dots, n$, is the set of concepts;
- $C = (C_i \in [0, 1]), i = 1, \dots, n$, is the set of values for the concepts;
- $W = (w_{ij} \in [-1, 1]), i, j = 1, \dots, n$, is the set of weights (w_{ij} is the causal link/relationship between the concepts A_i and A_j).

It is important to present readers to the strength and weaknesses of the proposed method adopted. One main advantage of FCM is that it offers a relative quick and easy way to involve stakeholders in participatory modelling or scenario projects. It can be used as a standalone tool to develop scenarios or as a very useful complementary tool for quantitative modelling approaches and by exploiting the knowledge on the operation of a system, decision makers and designer of systems are well informed. To everything that has an advantage or a strength, there is always a disadvantage or a weakness. Table 4 presents readers with the summary.

Table 4: Strengths and Weaknesses of the FCM Model

Has a quick way of developing models	If one does not pay attention to basic principles, models become inconsistent
High level of integration of new factors	Inconsistent if one mistakenly compares non-comparable factors, e.g., weight and units
It's possibility to model any scenario	Models may not be the actual view of the phenomenon, lack of proper validation
Helps identify directly the most important and unimportant factors through their influence	Model artefacts may render some factors important whereas not
Easy to assimilate expert or local knowledge	Difficult to judge accuracy or weights approximations
Help in negotiation and ownership with stakeholders; good in participatory progressions	Various stakeholders may interpret model results differently if FCM model is not grasp properly
Allows assessing system dynamics and eventually resilience, e.g., short and long-term changing aspects	Very subtle on input parameters
Flexible time definition	Unpredictable with weight of influences, difficult to implement seasonality
Aids the understanding of complex systems; overcome our mental limits and ability to interpret the influence of more interdependent factors	Due to it's quicker way of generating results, too much reliance on it may create confusion
Offers understanding on the role of a key feedbacks in the system	Effects of feedback can be highly reliant on primary conditions
Can be used to enhance the plots or storylines of scenarios	Detailed understanding of system dynamic is required before adopted

Source: Gray et al., 2015

3.6 District Profile

The Hohoe Municipal Assembly successfully enrolled to the REP on September 2012 and signed a memorandum of understanding with the program facilitators. Their vision and mission were focused on development to improving upon the lives of people. To achieve this objective, material, fiscal and human resources will be mobilized by the people to establishing the municipal as a leading one in the region.

Hohoe Municipal is one of the twenty-five Districts in the Volta Region. It is also one of the two hundred and sixteen Administrative Districts of Ghana. It's total surface area of 86 km². A total land surface area of 1,172 km², which is 5.6 % of the Regional and 0.05 % of the National land surface areas. It is located within longitude 0⁰ 15'E and 0⁰ 45'E and latitude 6⁰ 45'N and 7⁰ 15'N and lies almost in the heart of the Volta Region.

The District is one of the four main cocoa producing areas in the Volta region. It was the cocoa industry that made Hohoe a very important District in the Volta Region. It shares borders with the Republic of Togo on the east, forming part of Ghana's international border; on the southeast by the Afadzato District and the southwest with Kpando Municipality; on the north with Jasikan District; and on the northwest with the Biakoye Districts (Figure 3). The 2010 Census reveals that among the employed population 15 years and older, 31.0 percent are in the trading sector. This is becoming the mainstay of the population in Hohoe, the capital of the district. All the industries, which are small scale, are owned and managed mainly by sole proprietors.

MAP OF HOHOE MUNICIPAL



Source: Ghana Statistical Service, GIS

Figure 3: Map of Hohoe Municipal

Industry refers to the type of product or service rendered at a person’s workplace. In the Hohoe municipality and under the REP, our focus is on the small-scale industries. Changes in the structural composition of the workforce often reflect the course of social and economic development. As

a region progresses through industrialization, the proportion of workers in agriculture decreases while those in manufacturing and service sectors increase. The more urbanized the municipal is, the smaller the proportion of its workforce in agricultural, forestry and fishing industry.

The industrial sector in the municipality include manufacturing construction, artisans and craftsmen, technical infrastructure, trade and commerce and these have been grouped under seven categories to facilitate identification of prospects and promotional strategies (Table 5). These categories are;

- Agro-based: Fish processing, cassava processing and distilling, and coconut-oil extraction
- Mining: Salt mining and sand winning;
- Wood-based: Carpentry, Plywood processing factory and Toilet roll processing factory;
Textile: Kente weaving, Tailoring/dressmaking;
- Raffia weaving: Raffia basket weaving;
- Service: Hairdressing, Vehicle repair/fitting mechanics, Radio/TV mechanics, masonry;
- Ceramics: Pottery.

Table 5: Small-Scale industries that exist in the Hohoe Municipality of the Volta Region

0	Industry	Type	Product	Location
1	Gold Smithery	Small Scale	Jewellery (Ear rings, rings and necklaces)	Hohoe
2	Black Smithery	Small Scale	Hoes, traps, sickles, knives, etc	Alavanyo, Lolobi, Hohoe
3	Distilleries	Small Scale	Akpeteshie (local gin)	Hohoe, Fodome, Lolobi.
4	Bagged Water	Medium Scale	Water in sachets	Hohoe, Alavanyo
5	Key Cutting	Small Scale	All types of keys	Hohoe
6	Carving	Small Scale	Profiles and effigies	Alavanyo Dzogbedze-deme
7	Weaving	Small Scale	Kente clothes, napkins, kente stoles	Hohoe
8	Traditional Medicine	Small Scale	Assorted herbal preparations	Hohoe
9	Batik, Tie & Dye	Small Scale	Materials for clothing	Hohoe

10	Oil extraction	Small Scale	Edible palm oil, Palm kernel oil	Lolobi, Gbledi, Koloenu, Fodome, Akpafu, Likpe
11	Soap making	Small Scale	Local laundry soap	Lolobi, Likpe, Akpafu
12	Bakery	Small Scale	Bread, biscuits and confectionery	Hohoe
13	Milling	Small Scale	Cassava flour, maize flour, corn dough	Across the Municipality
14	Cassava processing	Small Scale	Cassava dough, gari	Across the Municipality
15	Rice mills	Small Scale	Polished rice	Hohoe, Lolobi
16	Ply wood production	Medium Scale	Ply woods of various sizes	Hohoe
17	Furniture production	Small Scale	Furniture of various types	Hohoe

Source: Own data from Field Report Hohoe

3.7 Planned Implemented Activities

Through consultation and research, the concepts that were identified as playing important role in the strategic planning process of the of the REP in the Hohoe Municipality and their actual results are explained below:

- Youth in Apprenticeship;
- Business Counselling;
- Business/small scale training;
- Asses to Rural Finance;
- Agriculture Commodity Infrastructure Development;
- Technology Promotion.

During the first quarter of the year 2016, a lot of business development activities were implemented in the district. Concerns were mainly on Technology Improvement and Packaging Skills Training in Baking and Confectionery were women in bakery were the beneficiaries. The participants were equipped with the skill of producing of the Wheat-HQCF composite flour and using the composite

flour to prepare Doughnuts, Bread, Chips and Queen's Cake through participatory demonstration and group work.

Another focus was on Technology Improvement and packaging training in Beauty care. The main beneficiaries were the National Hairdressers and Beauticians Association and Christian Youth Hairdressers and Beauticians Association, Hohoe. The participants were trained in Wreath and Wig Manufacturing skills to improve their work. The participants were made to work in groups to ensure active participation of each participant.

Basic Community Based Skills Training in Beekeeping and soap making. Cocoa farmers and Women palm oil processors group were the beneficiaries respectively. The participants were trained to produce locally manufactured soaps (Bar soap, Bathing soap and Liquid soap). The report revealed that about twenty-one cocoa farmers were enrolled under this program. The 21 cocoa farmers have been trained in beekeeping skills. This was done through practical means by which the participants were taken to the field where the bee hives are located.

Another most important concern was about Occupation Safety, Health & Environment Management Training. It was discovered that, owners of small-scale businesses and leaders of the small associations should be given this training. They were therefore enrolled under this training. The Participants were trained on how to combat fire at their homes and work places through demonstrations. The Environmental Health officer also sensitized participants on how to prevent food and water contamination due to the chemicals the participants are exposed to at their work places and transmittable diseases through demonstration on a flip chart. Since most participants were female, the Health officer through participatory demonstration sensitize the women on how to prevent mother and child death during child birth and the prevention and early detection of breast cancer and other health issues affecting women.

During the Second and the third quarter of the year 2016, concentration was on the Youth in Apprenticeship program (YAP). Majority of these youths are enrolled are unemployed. The program received many youths in the Municipality which are not governmentally employed or involved in any corporate jobs. This is a new enrolment of 101 youths into various skills of apprenticeship in the ongoing YAP.

During the last quarter of 2016 major activities included were improvement in Cocoa husk processing, beauty care, basic auto mechanic, Hazard Analysis and Critical Control Point (HACCP), Marketing, Quality Assurance and Staff Management Training for Food Processors.

4 DATA ANALYSIS AND FCM MODELLING

This section is devoted to the analysis and discussion of the results which includes the results obtained from the experts, the FCM simulation results and subsequently analysis of the data from the field. Much emphasis has been placed on the result obtained from the FCM using the concepts provided by the expert which are the core strategies of the REP being implemented in the District.

4.1 Gender Characteristics of Beneficiaries in the District

An analysis of the gender characteristics revealed which group of people dominated the various enterprises supported under REP s in the district. There is the need to find out the role gender plays in the implementation of REP. Gender equality is a potential driver for economic growth. Gender mainstreaming involves ensuring that a gendered standpoint is fundamental to all activities, including planning, implementation and monitoring of all program, projects, and legislation (Bradshaw et al., 2013).

From the data gathered the percentage of beneficiaries is represented in Table 6. The study revealed that 72 % of those who were enrolled under the program were Females while the remaining 28 % were males. From indication, more women are involved than men this is program. This also highlight the important role women have and can play in economic development.

Table 6: Gender characteristic of beneficiaries

Variable	Gender	Frequency	Percentage (%)
Gender	Male	467	28
	Female	1191	72
Total		1658	100

Source: Own data from NBSSI Hohoe

4.2 Project Interventions

It was also revealed that several project components were involve under the REP. Data was hence collected on the percentage of beneficiaries of such projects is being displayed on the pie-chart below. Majority of the youth which are unemployed are wilfully involved in Youth Apprenticeship which is about 36% while 31% received Business Counselling in the year 2016. Others also received Business/Small Scale Training (13%), Technology promotion (12%), Agriculture Commodity Infrastructure (5%) and the least (3%) received Asses to Rural Finance. This is represented in Figure 4.

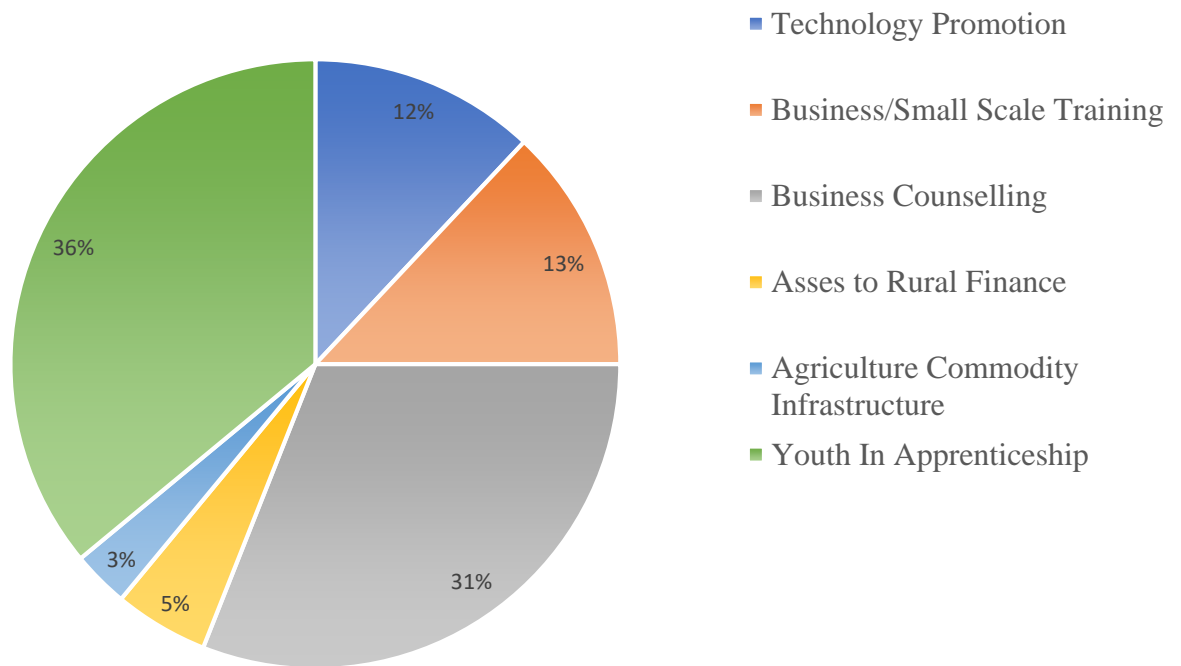


Figure 4: Project interventions received

Source: Own data from NBSSI Hohoe

It was realized that at least every beneficiary received one intervention, and some had received more than one intervention. The specific interventions received included tools and equipment, various types of training, marketing strategies and skills training, Occupation Safety, Health & Environment Management Training and financial management.

Under the Business Development / Small Scale several interventions were provided despite the small number of percentage involved. Beneficiaries however were trained in Soap making, Bee keeping, workshop management, CBT in Business Management and Planning, CBT in Beauty Care, CBT in Dress making. There are other business development interventions but in the year 2016, these were sectors that much benefited. Other intervention projects received training in technology hence technology improvement which will later be discussed. According to the data gathered, more than 40% of people received training in Soap making. CBT in Business Management and Beauty care were also highly popular in the District (Figure 5).

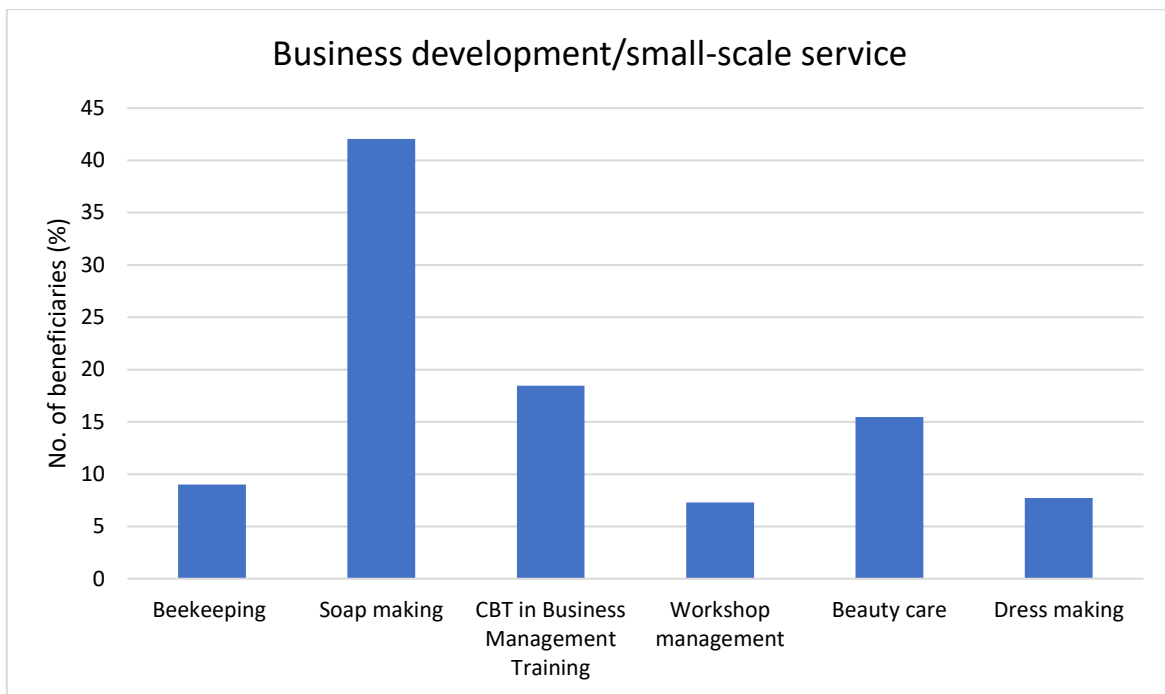


Figure 5: Distribution of business development and small-scale training services.

Source: Own data from NBBSI Hohoe

4.3 Expert View

The expert who happen to be the Head of the REP in the Hohoe Municipal Assembly was my main respondent. He is responsible for coordinating and managing the activities of the enterprise in the Municipality. He contributes to organisational quality systems and participates in implementing relevant policies and procedures that contribute to the continuous growth of the program in the municipality. I find him suitable as my respondent for the Research because, in terms of analytical thinking and judgement, he uses knowledge of sources and trends outside the organisation to make value added judgement on work related issues. He embraces the idea of this FCM idea which reveals he is ready to adapt new methodologies to tackle complex issue and generate new ideas and assessment of their practicability.

The expert uses the basic concept and techniques underlying the application of fuzzy logic to knowledge representation to respond to the questions. According to the level of success of the project Interventions in context of the strategic goals, the expert of the REP assigned these numeric values from 0 to 1 to the linguistic values, such as 0.1 to very low, 0.2 to low, 0.35 medium low, 0.5 medium, 0.65 medium high, 0.8 high, 0.9 very high. Linguistic variable is a perception or term

which is represented in natural languages, mostly an adjective or adverb, that its semantics is dependent on individual's observation and perception constrained by subjective knowledge and available information (Wang, 2009). With this knowledge, I presented a multi-criteria decision model to the expert to provide his assessment by eliciting linguistics expressions and these are simply means to approximate human activities and human reasoning. This information is represented in Table 7.

Table 7: Level of success of developmental goals - Expert view

Success of developmental strategic goals in the Hohoe Municipality			
	Goals	Level of achievement / Linguistic Values	Fuzzy Values
1	Youth in Apprenticeship	Medium High	0.65
2	Business Counselling	High	0.8
3	Business/small scale training	Medium High	0.65
4	Asses to Rural Finance	Very low	0.1
5	Agriculture Commodity Infrastructure Developm't	Low	0.2
6	Technology Promotion	Medium	0.5

Source: Own data from Interview

4.4 FCM Model Development

The FCMappers project aims at providing easy use of tools to work with FCMs. These tools help in analysing, organizing and depicting FCMs. Data obtained from the expert of the organization is being run using this software. FCMapper in its current version is based on excel and provides an in-built user-interface to convert fuzzy cognitive maps coded in matrices into an edge file format, which is readable. The user can work with Excel in a well-known environment and to take advantage of all inbuilt excel-features for working with the data, running the special FCMapper macros which enables a full analysis of FCMs within a few clicks.

In the fuzzy concept introduced by Yager and Zadeh (2012), the fuzzy set can be measured or considered as an extension of a classical set, clear difference is observed between members and non-members of a classic set, whiles in a fuzzy set the degree of membership is expressed by the membership function. The membership function $u_{\bar{x}}(x)$ describes the degree of membership of the

elements to the fuzzy set with a value in the interval [0, 1]. A fuzzy set \tilde{x} with membership function defined as $u_{\tilde{x}}(x)$ for all x that belong to the domain X is expressed as

$$\tilde{x} = \{(x, u_{\tilde{x}}(x)) / (x \in X), (u_{\tilde{x}}(x) \in [0,1])\}. \quad (4)$$

Expert assigns the weights of interval [0,1] to the concepts to describe their degree of membership and hence forming a matrix (Table 8). The concepts were represented in an adjacency matrix with the values in intersections between concepts representing the relationships that exist among the concepts. It further describes what impact one concept has on the other.

Table 8: Relationships that exist among the concepts in fuzzy linguistic terms

	Youth in Apprenticeship	Business Counselling	Business/small scale training	Access to Rural Finance	Agriculture Commodity Infrastructure Development	Technology promotion
Youth in Apprenticeship		strong positive	positive	weak negative	positive	positive
Business Counselling	positive		positive	neutral	strong positive	positive
Business/small scale training	strong positive	neutral		positive	neutral	positive
Access to Rural Finance	positive	strong positive	positive		positive	neutral
Agriculture Commodity Infrastructure Development	strong positive	neutral	neutral	weak negative		positive
Technology promotion	positive	positive	neutral	positive	weak positive	

Source: Own data from Expert

One important analysis of the cognitive maps is the mutual interactions (connections) of the concepts defined by the individuals with other concepts, and the intensity of these interactions are determined in fuzzy values as defined in Table 3. Based on the identified causal relationships the weighted matrix associated to the model was defined in Table 9.

The matrix from table 9 were copied into FCMapper and further results are generated. The matrixes are defined to be in the ranges between [-1; +1]. An FCM output is generated where a baseline scenario run for the map are calculated. From the data gathered, a Management Scenario is also run and compared up to 2 different scenarios. A minimum and maximum values between 0 and 1 from the baseline are assigned as the factor values for the calculation of the other scenarios and these factor values keep the value of this factor at the defined value; incoming connections that would increase or decrease the value of this factor are blocked.

Table 9: Relationship that exist among the concepts in fuzzy values

	Youth in Apprenticeship	Business/Small-Scale Training	Business Counselling	Access to Rural Finance	Agriculture Commodity Infrastructure	Technology Promotion
Youth in Apprenticeship	0	0.9	0.5	-0.25	0.5	0.5
Business/Small-Scale Training	0.5	0	0.5	0	0.9	0.5
Business Counselling	0.9	0	0	0.5	0	0.5
Access to Rural Finance	0.5	0.9	0.5	0	0.5	0
Agriculture Commodity Infrastructure	0.9	0	0	-0.25	0	0.5
Technology Promotion	0.5	0.5	0.5	0.5	0.25	0

Source: Own data from expert analysis

Calculated scenarios are being compared. That the result from first and second scenarios. The values the factors have reached at the end of the scenario calculations are compared to the values in the base run or the initial run. An increase in the value compared to the baseline indicates that this factor will show an increase under the conditions defined in the respective scenario.

In a dynamic analysis information is received on the dynamic behaviour of a FCM by calculating the influence one factor has on others over several iterations as explained early, so that the feedbacks between the concepts can play out. The value of a factor is calculated by summing up its positive and negative incoming links multiplied with the value of the connected concepts.

4.5 FCM Model Analysis and Scenario Simulation

From the idea of cognitive maps in the framework of “If-Then” scenarios and the formed adjacency matrices, the neural network simulations can be run, and in the framework of the derived results help predict about the future (Ozesmi, 1999).

Given an initial state of the system, represented by a set of values of its constituent concepts a FCM can evolve over time until a state of equilibrium, until it reaches the steady state. This steady state (scenario 1) can be used to make prediction or different scenarios. We assume they all are (1.00)

in the steady state. Modifications of some of the factors in the equilibrium state will yield to different actions or performances of the system. The scenarios do not offer any indication about the time axe (they are not able to predict the moment when something will happen), but they give an idea of the magnitude of system fluctuations after a disturbance. Two scenarios were simulated in the model:

First, I made a slight change of Business/small scale training factor from 1.00 to 0.9 and Agriculture Commodity Infrastructure Development factor from 1.00 to 0.2 in Scenario 2.

Secondly a change Youth in Apprenticeship factor from 1.00 to 0.9 and Access to Rural Finance factor from 1.00 to 0.2 in Scenario 3. This information is represented in Table 10.

Table 10: Scenario calculations of the concepts

Concepts/Factors	No Changes (Scene 1)	Scene 2	Scene 3	Results - No Changes (Scene 1)	Results - Scene 2	Results - Scene 3
Youth in Apprenticeship	1.000		0.900	0.980	0.960	0.900
Business Counselling	1.000			0.953	0.953	0.935
Business/small scale training	1.000	0.900		0.941	0.9	0.929
Access to Rural Finance	1.000		0.500	0.775	0.806	0.500
Agriculture Commodity Infrastructure Development	1.000	0.200		0.949	0.200	0.938
Technology Promotion	1.000			0.946	0.919	0.942

Source: Own simulations

Analysing the results from the Scenario 2 (Table 11 and Figure 6), I can draw the following conclusion: A change of Business/small scale training factor and Agriculture Commodity Infrastructure Development factor:

- Medium positive influence Access to Rural Finance;
- Weak positive influence on the Business Counselling;
- Strong negative impact on Technology.

Table 11: Comparing the management scenario with the steady state (Scenario 2)

	% of Variables Changed		
Scenario 2	57.14		
Positive Changes	strength (pos)	Negative Changes	strength (neg)
Asses to Rural Finance	1	Youth in Apprenticeship	1
		Business Counselling	4
		Technology Promotion	1

Source: Own results

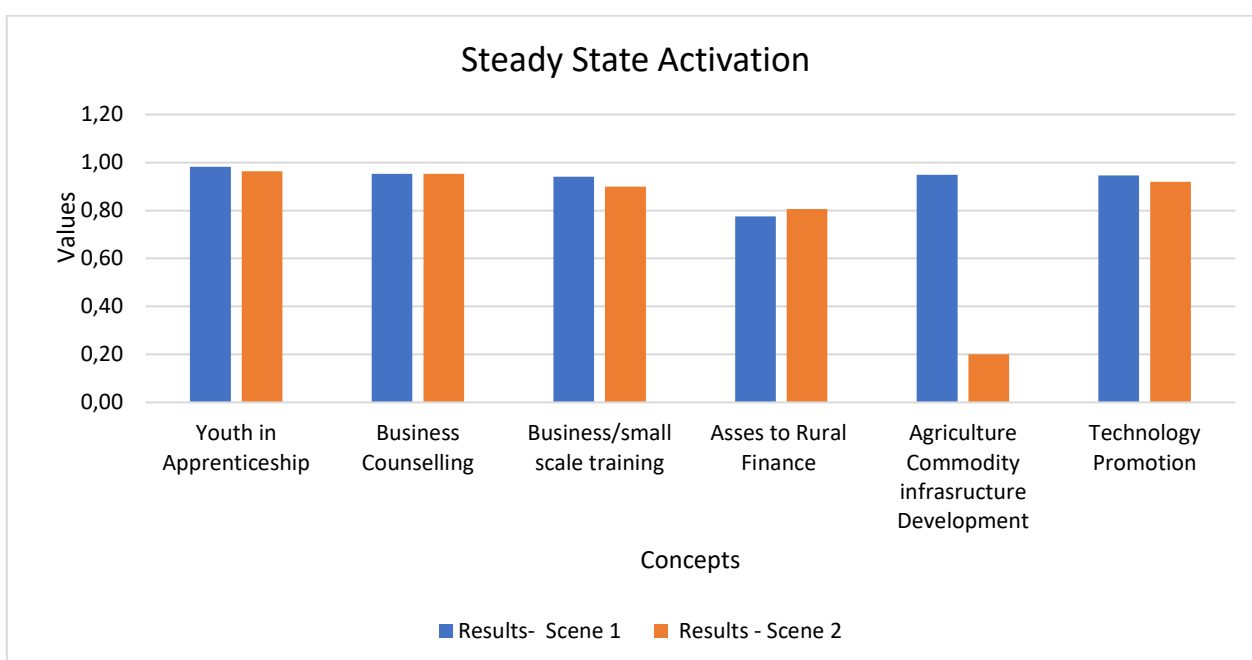


Figure 6: Comparing results of steady state and Scenario 2

Source: Own results

With the access to Rural Finance, which is mostly considered as a key variable, the result from the model shows that there is positive relationship between Business/Small Scale Training and Agriculture Commodity Infrastructure in the Hohoe Municipality of the Volta Region of Ghana. This also means that access to this facility leads to the growth of those factors. This access can take the form of either Leasing Credit Scheme or Trade/Micro Credit Scheme. Leasing is a medium-term financial instrument that covers investment needs of companies for logistics like, machinery, equipment, vehicles, Agriculture Infrastructures and other fixed asserts. This will enable producers

with inadequate equipment to access the hired ones to ease processing of their products. A very efficient leasing system of credit could respond to the equipment requirements of producers which could finally promote local development.

The Trade Micro Credit Scheme could take the form of a cash credit provided by rural banks and credit savings institutions to SMEs. It is an effort to respond to the capital requirements of SMEs. The financial institutions establish solidarity groups of these SMEs where group members commonly guarantee each other's loan amount and each individual group member is responsible for repayment in case any member defaults. This I believe would also improve the Business and Small-Scale activities and when delivered efficiently could enable SMEs purchase large quantities of raw materials at cheaper prices and access to the Agriculture Commodity Infrastructure at ease. It will also prevent them to escape the high Interest rate charged from Banks and other financial Providers.

For the third scenario, I have reached the following conclusion:

A change in Youth in Apprenticeship factor from and Access to Rural Finance factor

- weak negative influence on the Business Counselling;
- weak negative impact on Agriculture Commodity Infrastructure;
- weak negative impact on Technology;
- medium negative impact on the Business/ Small Scale Training.

There are absolutely no positive changes realized in scenario 3 (Table 12 and Figure 8).

Table 12: Comparing the management scenario with the steady state (Scenario 3)

	% of Variables Changed		
Scenario 3	57.14		
Positive Changes	strength (pos)	Negative Changes	strength (neg)
No change	0	Business Counselling	1
No change	0	Business/small scale training	1
No change	0	Agriculture Commodity Infrastructure Development	1
No change	0	Technology Promotion	2

Source: Own results

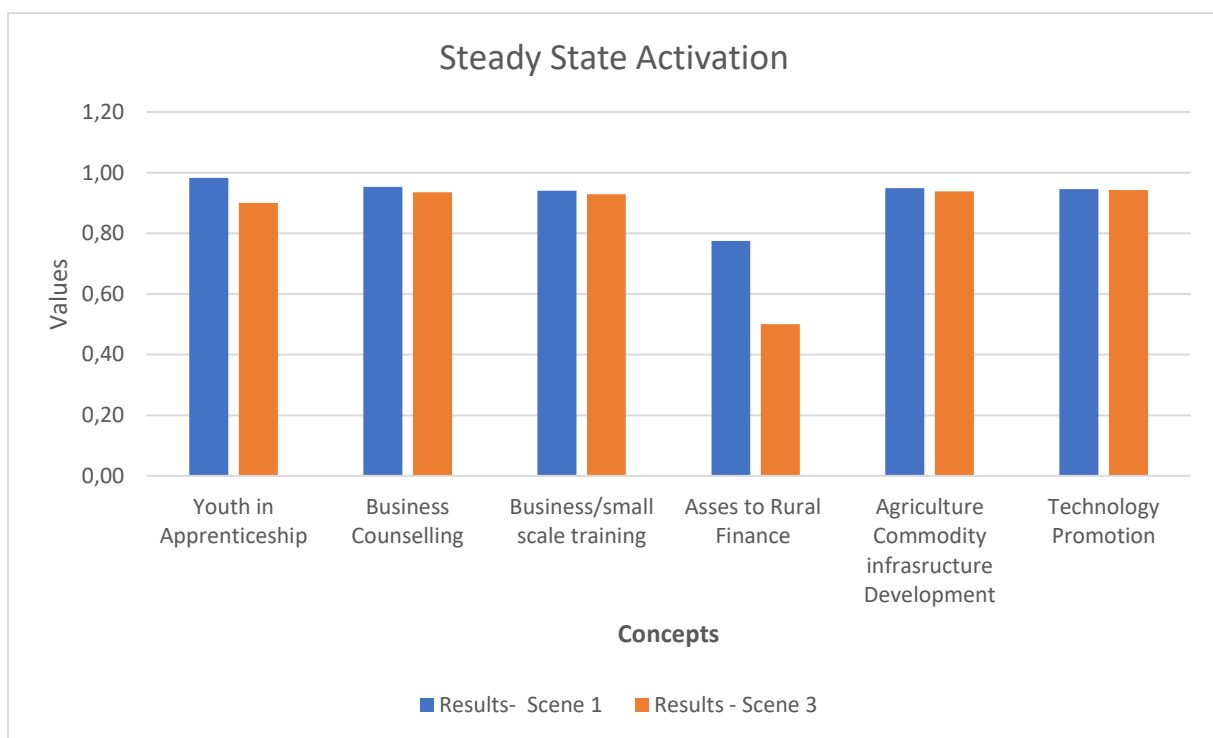


Figure 7: Comparing results of steady state and Scenario 3

Source: Own results

Analysis and representation of the importance of the variables in the aggregated FCM can be conducted according to their centrality and other FCM indices (Table 13). Table 14 shows the most central, indegree and outdegree concepts in the FCM.

Table 13: FCM indices

Terms	Definitions
Indegree	Cumulative strength (absolute value) of the connections entering a category
Outdegree	Cumulative strength (absolute value) of the connections exiting a category
Centrality	Sum of the indegree and outdegree for a given category Receiver A
Transmitter	A category with a on indegree and a positive outdegree
Ordinary	A category with positive indegree and outdegree Complexity The ratio of receiver categories to transmitter categories within a map (R/T)
Density	The number of connections within a map divided by the total connections possible between categories (C/N ²)

Source: Vasslides and Jensen (2016)

Table 14: Variables with the highest centrality, indegree and outdegree

Centrality(Influential)	Indegree (Receiver or State)	Outdegree (Driver)
Youth in Apprenticeship	Youth in Apprenticeship	Youth in Apprenticeship
Business Counselling	Business Counselling	Business Counselling
Technology Promotion	Agriculture Commodity Infrastructure Development	Asses to Rural Finance

Source: Own results

From Figure 8, the centrality scores of individual variables represent the degree of relative importance of a system component to system operation. Youth in Apprenticeship, Business Counselling and Technology Promotion are seen to be important concepts based on the centrality analysis. Expectedly, the most central variable or concept is Youth in Apprenticeship because majority of the youth wilfully enrolled to this program. Concepts with high indegree such as Youth in Apprenticeship, Business Counselling and Agriculture Commodity Infrastructure Development are influenced strongly by other concepts and are so-called receiving variables. Concepts with high outdegree are influencers or driving variables.

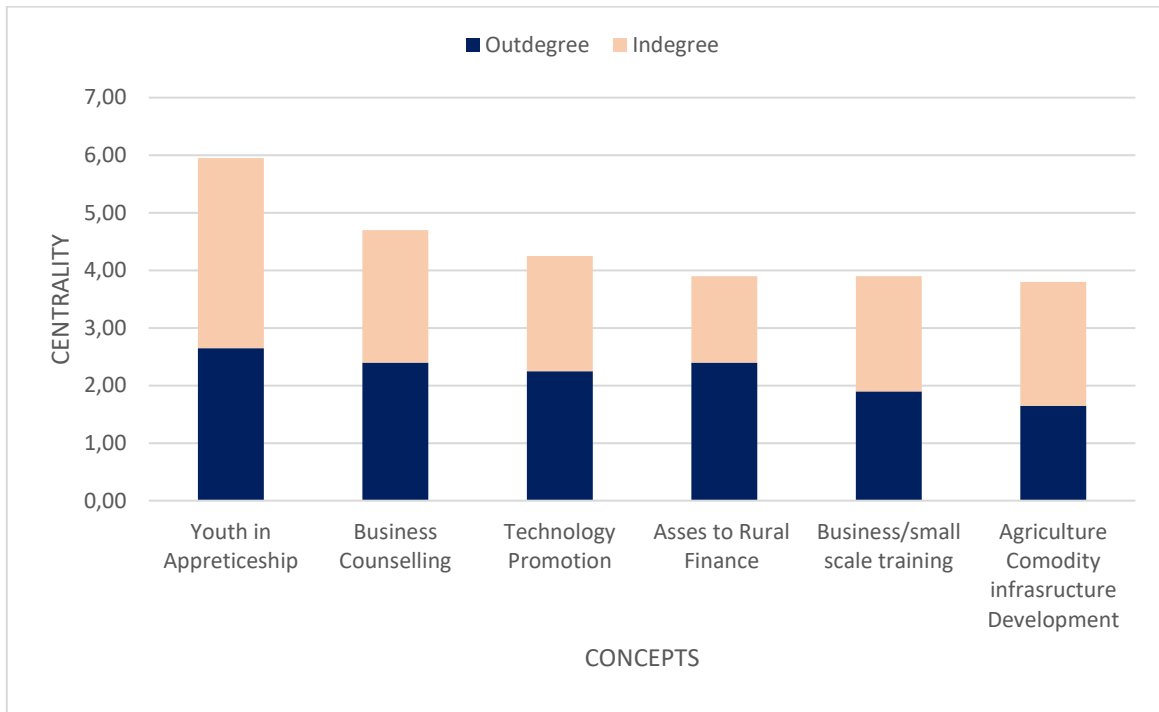


Figure 8: The aggregated centrality of the FCM concepts

Source: Own results

Having established the theoretical and practical values of the proposed strategic concepts through the above FCM analysis, it is also very useful to present the values on the equilibria graph to identify the impact a concept has in the process the regional strategic planning.

The graph ease significantly the complexity of deriving expert’s decision in strategy planning in the region. The parameters for the level of achievement of the concepts based on the expert view analysis was used as the scale to plot this graph. Youth in Apprenticeship with value 0.65, Business Counselling 0.8, Business/small scale training 0.65, Access to Rural finance 0.1, Agriculture Commodity Infrastructure Development 0.2 and Technology Promotion 0.5. Even though the level of achievement rated by the expert for Youth in Apprenticeship was “medium” with value of 0.65, the graph has clearly defined the role of YAP from the cognitive point to be a main driver of the strategic process thereby influencing positively other concert facts. The next one to be discussed is the Business Counselling, from the graph it is indicated that, this concept factor from practical analysis from expert view, rated 0.8 level but a clear point could be made that, for the fact that it has been the highest achieved in the district, doesn’t make it the major driving force. Other concert

factors remain almost the same on the graph as rated by the expert. Access to rural finance remains a concert with low level of achievement.

Summarizing results from the graph in Figure 9 indicates that Youth in Apprenticeship plays a major role in the strategic planning process.

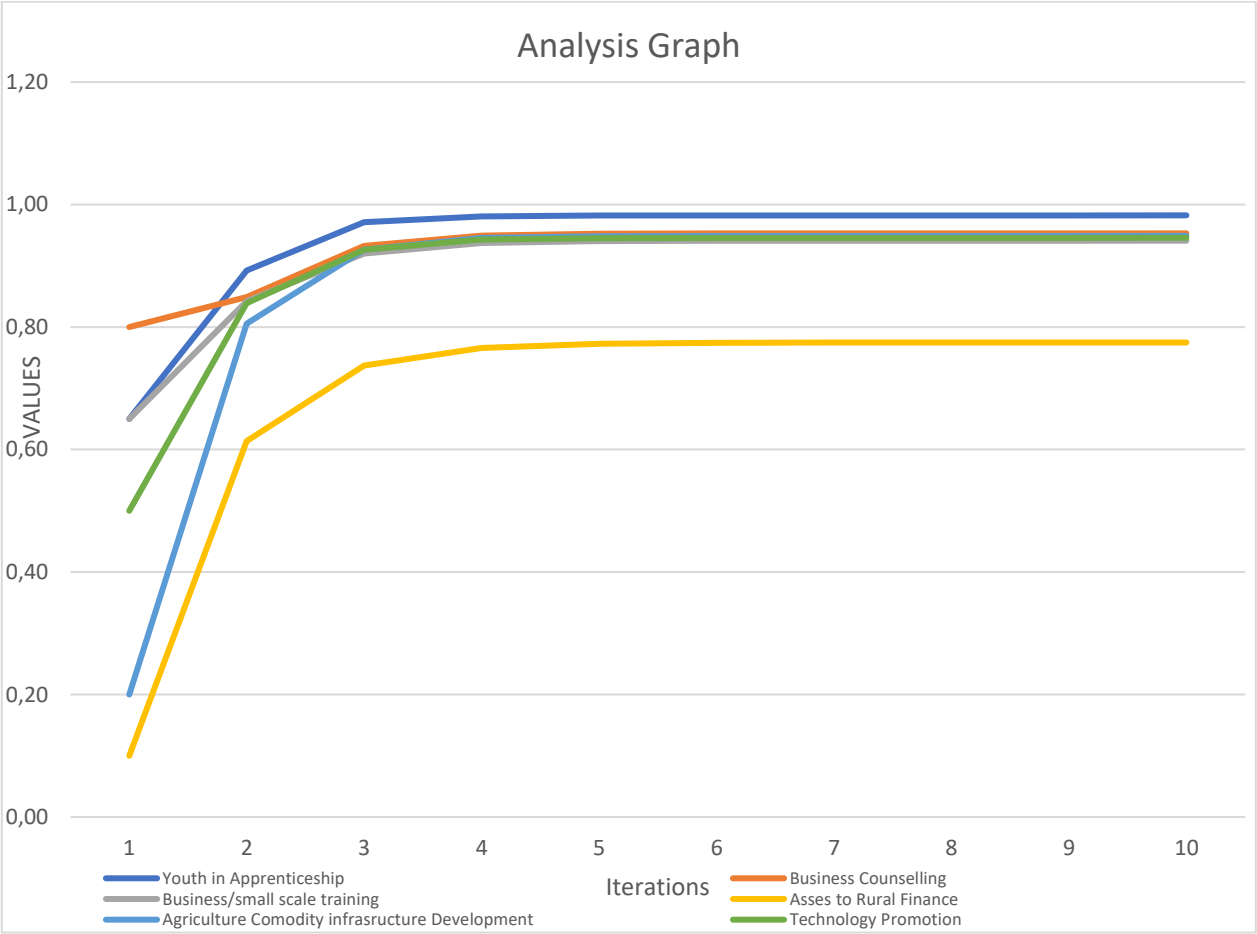


Figure 9: Equilibria graph of values of concepts for FCM model in ten iterations

Source: Own results

5 DISCUSSION

A lot has been said and written about the contribution of government and other institutions at different levels to help develop SMEs in developing countries. In Ghana, government has launched numerous development programmes and projects to help grow the economy. According to Kayanula and Quartey (2000), small scale enterprise promotion in Ghana was not impressive in the 1960s. As the economy declined in the 1980s, large-scale manufacturing employment stagnated which forced many formal sector employees into secondary self-employment to earn a decent income. It was with this view why governments established other organisations to support SMEs to grow to create a lot of employment situations in the country.

As a result of effective communication, analysis, economic and statistical information and simulations of the various strategic goals of the REP, I deduce and prove the hypothesis of the important factors or concepts which could influence the others in the region strategy planning. Youth in Apprenticeship, Business Counselling, Business/small scale training, Access to Rural Finance, Agriculture Commodity Infrastructure Development, Technology Promotion were the critical factors identified hence the current study of the formation of regional strategy plan in region development under the conditions of the regional policies and the role SMEs and enterprises play in economic growth is based upon the methods of practical, theoretical and fuzzy cognition.

Practically, data on the gender was gathered and it was revealed that 72% of those who were enrolled under the program were females while the 28% were males. More women are involved than men in this program. This also highlights the important role women have and can play in economic development even in the case of regional strategic planning. This is also because the total population of people living in the district reveals more women than men and this could also inform the type of project interventions received.

Due to this fact, I analysed the data on project interventions received under the REP for the year 2016. It was also revealed that several project components were involved under the REP. Majority of the youth which are unemployed deliberately enrolled in Youth Apprenticeship. This proves out to be a good strategy in development of the region.

6 CONCLUSIONS

In conclusion, SMEs play an important role in the economic development of both developed and developing nations of which Ghana is no exception. SMEs provides about 85% of employment in manufacturing sector, believed to contribute to about 70% to GDP and account for about 92% of businesses in Ghana which explains the role they play in strategic planning and economic development.

Focusing mainly on the Rural Enterprise Development Strategy as my case study and being able to identify their strategic goals and level of achievement, Youth in Apprenticeship and Business Counselling is highly crucial for the regional strategic planning of the district and the country.

The model described earlier has identified the major factors that influence the performance of the REP decisions and the causal relations that exist between them. Starting from the calculated equilibrium state where two scenarios have been analysed, to see how a minor variation in one variable can influence the other factors and, therefore, the state of the system. These scenarios can be used to make predictions of how the system will react to changes. Based on these changes we can draw a conclusion that critical attention should be given to the factors which allows a change in the system.

Detecting knowledge gaps, effects and relationship of concepts and at the same time creating a common basis on which the stakeholders can discuss and try to resolve them is an important contribution of FCM to integrated or adaptive management approaches. The potential economic benefits of sustainable access to rural finance in the Municipality are compelling, and its potential effects on the development process cannot be understated. Business and Small-scale activities and Agriculture Commodity Infrastructure reveals a positive influence on Access to Rural Finance which implies a call for a holistic approach to facilitating the development of the microfinance sub-sector thereby unleashing its potential for accelerated growth and development.

The main policy implication of the study is that the government of Ghana should invest more into the REP to meet the credit needs of the SMEs in the country for a speedy economic growth of Region and the Country. It is believed that the solitary factor constraining the growth of the SME sector is the lack of access to rural finance. From research I discovered some factors which could possibly account for this lack of finance:

- Comparatively there exist no developed financial sector with low levels of intermediation for the people to have easy access to credit.
- There exist no institutional and legal structures that ease the management of SME lending risk.
- High cost of borrowing and rigidities interest rates. Because of the persistent financing gap, many interventions have been launched by governments and development partners to stimulate the flow of financing to SMEs over and above what is available from existing private sector financial institutions.

This the government may achieve through the following ways:

- Easy accessibility to credit through specialized or development-oriented banking or financial institutions should be encouraged. This fund should be made available to the SMEs at reduced interest rate.
- Establishment of a well-funded National Credit Guarantee Fund that will assist for credit facilities from the banks and other financial institutions. This will help reduce the excessive demand for collateral security.
- Development of clear national development objectives to meet the needs of the SMEs sector. That is, formal policies and regulations that guarantees achievement of anticipated results of SMEs.
- Also, attainable policy intervention by the government through business measures, tax incentives or monetary initiatives could be a medium to improve the apparent magnitude of importance of monetary policy in their relationship with performance and in realising the firm valuable resources. the worth - creation method depends on the interpretation translation of competitive dynamics into property money flows. A necessary condition for the worth inherent in strategic assets to guide enhance firm worth is appropriate for finance provision selections. SMEs ought to try and use or attain the most effective edges from government policy or initiatives.

In addition, the FCM results can help to focus model design on issues which are of importance for the stakeholder. The concepts of factors such as Youth in Apprenticeship and Business Counselling that have a positive and negative influence on the other factors could be taken highly into consideration. More youth should be targeted and enrolled on different program as the region is

highly populated with youth which is not different from the population pyramid of Ghana and this gives a clear insight about social, political and economic development.

I hope this grounding will help inform both practitioners and policy-makers identify key drivers of the REP phenomenon and the roles it plays in regional strategic planning in the wider economic and societal context.

For policy makers to fully develop and use this model potentially, appropriate strategies such as developing networking with other districts and regions must clearly be designed and implemented to compare various Region strategies and level of achievement.

In addition, further research should be made into ways of gathering information and the formulation of competitive strategies across regions. Lastly, variety of forces and trends such as social, political, economic, educational and the physical environment should be monitored to help decision makers and planners on the opportunities and challenges.

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Appendix: SUMMARY OF HOHOE NBSSI/BAC PLANNED IMPLEMENTED ACTIVITIES 2016

S/N	NAME OF ACTIVITY	NAME OF BENEFICIARY GROUP	VENUE/ TOWN OF THE ACTIVITY	NO. OF PARTICIPANTS			STATUS
				MALE	FEMALE	TOTAL	
	First Quarter						
1	Technology Improvement and Packaging Skills Training In Baking and Confectionery	Women Bakers group	Hohoe Trevi	0	13	13	The participants were equipped with the skill of producing of the Wheat-HQCF composite flour and using the composite flour to prepare Doughnuts, Bread, Chips and Queen's Cake through participatory demonstration and group work.
2	Technology Improvement and packaging training in Beauty care	National Hairdressers and Beauticians Association and Christian Youth Hairdressers and Beauticians Association, Hohoe	Hohoe	0	36	36	The participants were trained in Wreath and Wig Manufacturing skills to improve their work. The participants were made to work in groups to ensure active participation of each participant.
3	Basic Community Based Skills Training in Beekeeping	Likpe Nkwanta Cocoa Farmers group	Likpe Nkwanta	17	4	21	The 21 cocoa farmers have been trained in beekeeping skills. This was done through practical means by which the participants were taken to the field where the bee hives are located.
4	Basic Community Based Skills Training in Soap Making at Fodome Amele	Women palm oil processors group	Fodome Amele	5	32	37	The participants were trained to produce locally manufactured soaps(Bar soap, Bathing soap and Liquid soap)

5	Basic Community Based Skills Training in Soap Making at Hohoe Zongo	Women Group	Hohoe Zongo	4	57	61	The participants were trained to produce locally manufactured soaps(Bar soap, Bathing soap and Liquid soap)
6	Occupation Safety, Health & Environment Mgt.Trng	Masters and Madams of Association of Small Scale Industries (ASSI) Hohoe	Hohoe	9	20	29	The Participants were trained on how to combat fire at their homes and work places through demonstrations. The Environmental Health officer also sensitized participants on how to prevent food and water contamination due to the chemicals the participants are exposed to at their work places and transmittable diseases through demonstration on a flip chart. Since most participants were female, the Health officer through participatory demonstration sensitize the women on how to prevent mother and child death during child birth and the prevention and early detection of breast cancer and other health issues affecting women.
7	Youth in Apprenticeship Programme (YAP)	Unemployed youth	Municipality	40	61	101	This is a new enrolment of 101 youths into various skills of apprenticeship in the ongoing Youth in Apprenticeship Programme with details in the table below
	Sub-total			75	224	299	
	Second Quarter						
8	Youth in Apprenticeship Programme (YAP)	Unemployed youth	Municipality	128	435	563	On the 17 th & 18 th of May 2016, a counselling session was held for the apprentices as well as a review of the programme. The Municipal Chief Executive

							of the Hohoe Municipality and the NBSSI Regional Director and other officers were in attendance. The counselling session was fully funded by the Municipal Assembly and supported by the Northern Volta Cooperative Society in Hohoe
	Sub-total			128	435	563	
	Third Quarter						
9	Youth sent to receive training in Farm Based Agri Business at Adidome Farm Institute	13 Youths	Adidome	13	-	13	All the 13 youths have successfully completed the training in the areas of Poultry, Beekeeping, Pig Production, and Goat and sheep rearing.
10	CBT in Business Management and planning	Apprentices of Ghana National Tailors and Dressmakers Association	Hohoe	2	41	43	They were train in workshop management and planning and How they should interact with their Madams/Masters and customers as well as prepare them for NVTI exams
11	Counselling for clients on how to expand production	Clients	Municipality	19	5	24	Issues relating to access to raw materials and marketing strategies were discussed as well as commitment to the use of skills acquired and consistency in production
12	Counselling for Youth in Apprentice Programme Apprentices	The youth	Hohoe	107	307	414	Counselling session organised for apprentices of Mastercrafts persons within the Municipality
	Sub-total			141	353	494	
	Fourth Quarter						
13	Technology Improvement in Beauty Care	Hairdressers Association	Ahado	1	57	58	The Master crafts women and a man were trained to make and use beads Jewellery to improve their profession. Participants were

							put in smaller groups to ensure that all participants acquire the skills.
14	Technology Improvement in Cocoa Husk Processing	Multivision Farmers Association	Likpe Bala	9	26	35	The youth farmers were trained to add flavours to the "Alata" bathing soap, packaging into sizable units and ensuring quality control Measures at production centre
15	Technology Improvement in Fashion Design & Production	Dressmakers Association	Ahado	3	30	33	The master crafts persons were trained to sew a wedding dress. This was done through presentations, group assignment, and practically sewing the Wedding Gown
16	Basic Auto Mechanics (Vehicle Diagnosing)	Master Auto Mechanics	Ahado	17	0	17	The Master crafts men were taken through the procedures of using a diagnostic device to diagnose a vehicle. This was done through presentations, group assignment and working on a car using a diagnostic device
17	Hazard Analysis And Critical Control Point (HACCP),Marketing, Quality Assurance and Staff Management Training for Food Processors	Food Processors	Hohoe	10	10	20	This Programme was organised by NBSSI for food processors within the Municipality.
18	Traditional Apprentices training in Workshop Management	Apprentices	Ahado	29		29	The apprentices were taking through effective workshop management practices since they assist the master crafts persons at the workshop to ensure safety and the protection of life and properties

19	Technology Improvement and Finishing in Auto mechanics	Master Auto Mechanics	Ahado	19		19	This was to further improve the efficiency of the Master crafts persons
20	Business Counselling for Entrepreneurs	Entrepreneurs	Municipality	35	56	91	Counselling session organised for apprentices of Mastercrafts persons within the Municipality
	Sub-total			123	179	302	
	TOTAL			467	1191	1658	