

Clustering Technology for Analysing Small and Medium Enterprises to Develop Strategies for Sustainable Development

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The survival rate of Small and Medium Enterprises is decreasing despite several measures taken by governments all over the world. To apprehend the current scenario, this research uses qualitative content analysis to explore the core keywords ‘success’ and ‘failure’ embedded in the data to develop strategies for survival and growth of small and medium businesses. The researchers extracted factors from the case studies by using intelligence analytical tools data mining and SPSS 25, then reviewed the factors affecting the strategies by linking the factors which are either correlated or impact each other, thereafter a conceptual framework is built based on System Theory. Relation Patterns Discovery Process generates a set of principles that are indispensable for developing sustainable strategies for SMEs. All the resultant factors have been divided into three categories, external, internal and moral & ethical factors and their relationship with survival strategies has been developed. The generated new framework demonstrates innovative relationships over the most influential business factors. The obtained results from this work are accurate and will be of vital importance not only for small business owners but also for the potential businesses.

Keywords: *SME, Oman, Entrepreneur, Success, Failure*



INTRODUCTION

A strong network of Small and Medium Enterprises (SMEs) set the nation on a growth path. They are the stimulators of growth and a barometer of sustainability of the economy. According to worldbank.org,

"SMEs account for the majority of businesses worldwide and are important contributors to job creation and global economic development. They represent about 90% of businesses and more than 50% of employment worldwide. Formal SMEs contribute up to 40% of national income (GDP) in emerging economies. "

Oman is not different from the other countries around the world. Though the contribution of SMEs to GDP in Oman is 15%, which is far behind the average, SMEs are at the forefront of the Oman government's 2040 vision and plans. They aim to promote enterprises, promote innovation and increase productivity (Economic News, February 28, 2019). SMEs are key to the long-term economic growth of Oman. They reduce the dependence of economy from a few focused sectors. Oman NSCI data regarding the new registrations of SMEs shows a declining trend from the year 2017 to 2018 to 2019 (Oman Observer, October 12, 2019). Thus, it becomes important to have an in-depth understanding of the factors responsible for the declining trend.

LITERATURE REVIEW

Shannaq et al, (2019) highlights that during crisis and high competition in the market, small businesses need to optimise and structure their activities through logistics technologies (specialised software, improving warehouse activities, etc.). The research paper discusses the features of the functioning of small business in the Oman market. The most typical factors hindering the development of enterprises are highlighted.

Ghosh et al, (2001) studied the top 50 successful enterprises in Singapore to determine the strategy dynamics and key success factors adopted by these firms. The major strategies adopted were strong management teams and dynamic leadership, identifying and focusing on marketing, and developing good relationships with customers. But as the competition in the market increased, they shifted from defender strategy to prospector and analyser strategies. Strong organisational capabilities and broad base support and resources, like latest technology, also helped them in being successful. But during economic crises SMEs are the most affected.

Shannaq et al, (2020) in their research suggested segregating customers on the basis of their purchasing pattern. To increase efficiency, highlight the differences and commonality between customers in different segments and thereafter target efforts towards attracting the right customers.



A study by Naidoo, V. (2010) investigated Chinese SMEs, their market orientation, marketing innovation in terms of improvement in marketing mix, competitive advantage and its impact on firm survival and found that SMEs who have developed competitive advantage in terms of cost effectiveness and product differentiation were more likely to survive and if SMEs had inter-functional competency, they were better prepared to face competition.

Financial and non-financial performance of small and medium enterprises has been studied for quite some time. Working capital management has a great impact on the profitability of small and medium-sized firms. They are highly correlated. Managers can create profitability by increasing the inventory turnover and the debtors' turnover rate (García-Teruel & Martínez-Solano, 2007).

Another researcher group (Smallbone et al, 1995) investigated the development of a group of manufacturing industries between 1979-1990, comparing the strategies followed by high growth and low growth firms and found that high growth firms were not production-led but they had an ability to change their production complementing to active market development and they focused on internal organisation structure, developed leadership skills in operational activities and the owners focused on development strategies. They also improved labour productivity along with generating new employment.

Bilal & Maqbali (2015) highlight the difficulties and problems faced by SMEs in Oman. The main obstacle is the investment environment itself, followed by owners' capabilities. Finances pose less of an obstacle than marketing, whereas the legislations and regulations obstacles are the least problematic. If the SMEs want to be successful they must work in collaboration with each other, maintaining a supportive network becoming efficient in small project requirement and delivery. As they have more pliability, the technological changes can be adopted and harnessed for sustainability (Moore & Manring 2009). Kumar et al, (2014) studied the strategy developed by small and medium enterprises to improve networks in the supply chain in order to face competition. They found that inefficiency to predict the market demand, unorganised SME networks and numerous brokers in the supply chain are the main problems faced by Indian SMEs.

The SMEs should focus on quality control, timely delivery and cost efficiency strategies. Small and medium-sized enterprises must focus on their innovative launching and market entry strategy to establish them, become market pioneers and skim the milk. Late followers must settle down with lower profit margins. The SMEs should work on a strategy of combining knowledge of innovation and follower strategy (Bouncken et al, 2015). The SMEs' characteristics should be studied and the advantages and disadvantages should be analysed. The relationship between corporate strategy and marketing strategy must be found (Marek, 2014). Strategies adopted by SMEs in South Africa were studied during the global recession period as this period is considered to be most crucial for the



survival and growth of SMEs. During this period, the consumer demand substantially reduced and special strategies were adopted to restore the SMEs (Scheers, 2018).

The researchers Leitner & Guldenberg (2010) studied the SMEs for a period of 10 years between low cost-efficiency and differentiation strategy and SMEs with no Strategy and found that SMEs adopting combination strategies outperformed their counterparts in terms of profitability and growth. A short cash conversion cycle (CCC) also improves the profitability. Baños-Caballero et al, (2010), found that firms try to adjust their sales targets with their cash conversion cycle. Longer CCCs were found in case of older firms having high cash flows. The working capital management was found to be aggressive in case of firms having higher opportunities, a high debt-equity ratio and a higher return on assets (ROA).

Salazar et al, (2012), examines the relationship between organisational strategies, level of competitiveness and financial decision making. The results show that due to poor growth in sales, lack of competitiveness and lack of free flow funds, most micro and small enterprises follow financial concentrated strategies focusing on short term problem solution rather than long-term strategic growth. Firms that have a balanced short term solvency and liquidity ratios are likely to survive longer.

All the studies show that SMEs have to adopt certain strategies for survival in the given context, may it be competition, global crisis, lack of managerial skills or leadership capabilities. Only right strategies at the right time can help survival and growth of SMEs, but the SMEs of Oman have peculiar characteristics. Most of the small business owners and entrepreneurs in Oman are in their first generation, either they have started business themselves or by the government initiative. They have less professional knowledge of running business and managing them, they also lack in business tactics regarding marketing and outsourcing. On the other hand, there are several examples of age-old family businesses that have survived for years and hold a big market share, they have survived, pre-oil era, during oil crisis and post oil era as well. The strategies adopted by such businesses needs to be studied individually on a case to case basis.

SMES IN OMAN

According to the Public Authority for SME Development (PASMED), in Oman, 90% of total businesses are Small and Medium Enterprises (SMEs). They contribute around 15% of GDP (Times of Oman, 14 March 2018) and also provide employment. Unfortunately, new registrations of SMEs in Oman declined 36 per cent to 3,059 in the first half of 2018 from 4,778 new registrations in the same period of the previous year, according to the statistics released by the National Centre for Statistics and Information (NCSI) as reported by the Oman News Agency. The new registration of



SMEs is reducing; the ones established within a period of 1-2 years are struggling for their survival and are on the verge of shutting down. But on the other hand, there are some SMEs and family owned businesses that have not only survived for a long time but are also enjoying good business and profitability. A deep insight on strategies adopted by such struggling/successful business owners who have survived/struggling to survive for a long time in the Oman economy, during pre-oil crisis, during crisis and post-oil crisis era, can offer new understanding of the markets, survival strategies and can guide the new businesses towards sustainable growth.

Small and medium enterprises usually have many constraints. Due to financial constraints, they are unable to fetch professional help. They lack in innovative ideas, proper planning, proper strategy and effective and timely entry to market. They have difficulty in attracting finances and hiring skilled workers. They are unable to compete for bigger or impulsive orders, unable to fulfil tender requirements, they have weak network of inbound and outbound logistics, supply chain management, customer relationship management, peer group contacts and an inability to fulfill government requirements. They bear all the challenges and limitations themselves. Entrepreneurs are seldom good managers. Further, in subsequent years, inefficient management of finances leads to payment delays. In their urge to sell, they usually go for credit sales resulting in higher bad and doubtful debts. Many times, requisitions are cancelled due to delayed supplies; poor quality management etc. leading to unsold stockpiles, resulting in mismanagement of funds.

RESEARCH OBJECTIVES

The main objective of this study is to examine the strategies followed by the successfully surviving SMEs in Oman and to recommend strategies to be followed by SMEs for survival and growth.

RESEARCH METHODOLOGY

In this paper a multiple case study method was used to investigate the strategies used by small and medium businesses to survive and to keep up pragmatic growth. The researchers conducted semi-structured interviews with six small business managers/owners, who have been successful in surviving beyond five years but are still working hard in maintaining/expanding their businesses. The sampling technique was selective and conditional. Firstly, as the researchers wanted to select two groups of small/medium businesses, one, who have struggled and survived for more than 5 years but less than 15 years successfully (three case studies) and those businesses who are successfully running for more than 70 years (three case studies). Secondly, they are willing to share their strategies with others. 25-30 business owners were selected initially and were personally contacted by the researchers. 17 interviews were conducted, but they left the interview either midway, hesitated to answer the questions, were suspicious about the information sharing and



finally rejected the interview and discontinued. Only six business owners responded with in-depth information. Their industries/ business were located in Thymasa Industrial area, Nizwa, Souk Nizwa and Rusayal Industrial area, Muscat. The in-depth interviews provide insight on how to manage the business, deal with financial and non-financial matters, how they have handled crisis and what strategies were followed by them to sustain and develop their business.

Oman has seen a great downturn in recent years due to the de-escalating prices of crude oil and it being a major oil dependent country, had to face economic challenges. In the light of this, the Oman government has also taken wide measures to divert the concentration from being an oil based economy towards entrepreneurship and small business development.

DATA COLLECTION

Qualitative primary data was collected by self-administered, open ended, pre-planned questions related to establishment of businesses, strategies adopted, financial and non-financial support, their credit policies, innovation, technologies adopted and the like, mentioned under the heading 'Theme' in Table 1. 'Factors and Relationship Pattern'. Visits were made to the various Industrial areas. The major industries visited were: manufacturer of steel furniture; manufacturer of water tanks; manufacturer of Omani halwa (Sweets); manufacturer of Omani kahwa (Coffee); manufacturer of Omani silver khanjar (Sword) and other jewelry, antiques & gifts; and manufacturer of plastic sufras (disposable sheets) and polybags.

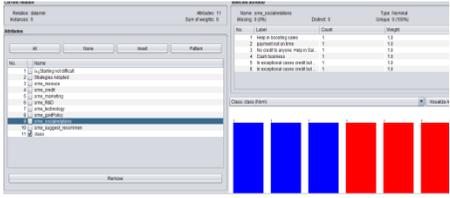
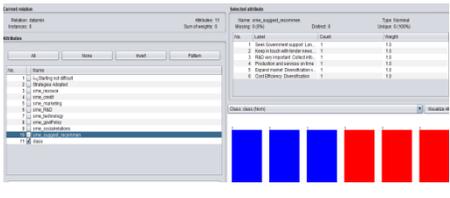
DATA ANALYSIS

The data was first converted into relatable themes through thematic analysis, thereafter, business intelligence tools data Mining (WEKA) and SPSS 25 were used and through Relation Patterns discovery process, the themes were converted into patterns showing the factors responsible for success or failure for the SMEs. Table 1 further demonstrates the detailed analysis. It shows that there are some internal and external factors responsible for successful survival of SMEs in Oman.

Table 1. Factors and Relationship pattern

Themes	Relationship pattern	Result
Starting not difficult		<p>Average effect on failing User behaviour not mature to understand the business challenge</p>
Strategies Adopted		<p>Success factors: Business plan prepared by professionals, old experience, ideas from abroad. Factors of failing: Using traditional process, not giving importance to strategy</p>
sme_resource		<p>Success factors: Government funding, parent company funding, personal funding and bank finance Factors of failing: Personal and bank finance</p>
sme_credit		<p>Success factors: Supplier policies are strict Factors of failing: Debtors delay in payment, cash business, supplier policies are moderate, debtors delay in payment, moderate cash sales</p>

<p>sme_marketing</p>		<p>Success factors: Cost reduction strategy, no marketing budget required for government tenders, self-marketing, self-delivery of goods, high demand, unable to supply</p> <p>Factors of failing: No marketing, no Expansion plan, cost reduction not done, product diversification not done, no seasonal purchasing strategy, differentiation not done, no marketing budget</p>
<p>sme_R&D</p>		<p>Success factors: Always required for new product process, new market search, low R&D costs, depend on government tenders only, always searching for new customers, new process, new material</p> <p>Factors of failing: R & D not required, no search for new product availability</p>
<p>sme_technology</p>		<p>Success factors: New technology adopted</p> <p>Factors of failing: New technology moderate adoption</p>
<p>sme_govtPolicy</p>		<p>Success factors: Government started levying taxes, full support by govt., accept hiring policy, must employ locals, licensing renewal difficult, skilled labour not available, local workers are expensive</p>

		<p>Factors of failing: Government started levying taxes, some govt. rules not supporting</p>
<p>sme_socialrelations</p>		<p>Success factors: Help in boosting sales, payment not on time help in sales, no credit to anyone factors of failing: cash business, In exceptional cases credit but difficulty in collecting debts and dues</p>
<p>sme_suggest_recom men</p>		<p>Success factors: Long term planning, seek government support, keep in touch with tender news and advertisement, collect information, R&D very important, cost efficient strategy Factors of failing: Production and services not on time, diversification not important, expand market diversification, cost efficiency</p>

From the findings of Table 1, the following recommendations for SMEs could be generated:

All the factors influencing the strategy and on which the vital activity of a business depends are divided into three groups: External Environmental Factors, Internal Environmental Factors and Moral & Ethical factors (Johnson et al, 1964).

Virtually all factors affecting the strategy can have a positive or negative effect on a business. The task of small business owners is to ensure that the factors influencing the strategy positively are adopted and the negative factors influence, if possible, is minimised.

Both internal and external factors affect the business but the factors often change and so the small and medium businesses should update themselves with the new trends in the market, the latest news, new products, new technology, new processes and new innovation and ideas. There is a possibility that not all new factors that appear fit into the original business strategy, some factors can open up new prospects for business development or new opportunities for improving small businesses, or, conversely, force them to abandon some initial ideas.

Small business owners should constantly be aware of the need to change business strategies from time to time depending on the influence of the factors such as increased competition, changes in the economy, the emergence of new regulations, or factors such as reduced productivity, increased business costs, high employee turnover, increased production costs, and prices for materials and components, etc.

THE IMPACT OF INTERNAL AND EXTERNAL FACTORS ON THE BUSINESS STRATEGY

The impact of the factors on the business strategy is different and not equivalent. And any business strategy to achieve a relative advantage over other businesses should achieve an optimal balance between the factors contributing to the business and the factors vicious to it. Figure 1 further demonstrates the performance of the nature of the business and the various factors influencing them.

Figure 1: Business performance and factors influencing them

item	furniture	Polycon	plastic industry	omanihalwa	Flourmils	antiquigift
Starting not difficult	yes	yes	no	yes	yes	ü
Strategies Adopted	Business Plan by Professionals	Old Experience	Idea from Abroad	Traditional	Traditional	Traditional
sme_resource	Government Funding	Parent company funding	Personal funding	Personal	Personal and bank Finance	Personal and bank Finance
sme_credit	Debtors delay in Payment Supplier	Debtors delay in Payment	Cash Business	Cash Business	Debtors delay in Payment	Cash Sales Supplier policies are s
sme_marketing	No marketing budget Cost reduc	Government Tenders	Self-delivery of goods Self-m	No marketing Hig	Product Diversification Cc	Product diversification Seasonal
sme_R&D	New Market Always required for	Depend on Government te	New Process Always search	Not required	Not required	Search for new product availabil
sme_technology	Adopted	Adopted	Adopted	Moderate adoption	Moderate Adoption	Adopted
sme_govtPolicy	Full support Government started	Full support Government	Licensing renewal difficult Gc	Government starte	Government started levyi	Some govt rules not supporting
sme_socialrelations	Help in boosting sales	payment not on time	No credit to anyone Help in	Cash business	In exceptional cases credit	In exceptional cases credit but D
sme_suggest_recommen	Seek Government support Long t	Keep in touch with tender	R&D very important Collect	Production and ser	Expand market Diversific	Cost Efficiency Diversification

After the comparison of overall recorded data, we obtain the proximity matrix process information. Figure 2, 3 and 4 further demonstrates the Experiment Information.

Figure 2: Experiment Information

```
SAVE TRANSLATE OUTFILE='C:\Users\aboum\Desktop\for_kaneez\datamin.csv'
/TYPE=CSV
/ENCODING='UTF8'
/MAP
/REPLACE
/FIELDNAMES
/CELLS=VALUES.

Data written to C:\Users\aboum\Desktop\for_kaneez\datamin.csv.
7 variables and 12 cases written.
Variable: item                Type: String  Width: 22
Variable: furniture           Type: String  Width: 87
Variable: Polycon             Type: String  Width: 53
Variable: plasticindustry     Type: String  Width: 116
Variable: omanihalwa         Type: String  Width: 61
Variable: Flourmils          Type: String  Width: 86
Variable: antiquigift        Type: String  Width: 89

NEW FILE.
DATASET NAME DataSet1 WINDOW=FRONT.
CLUSTER  Startingnotdifficult StrategiesAdopted sme_resouce sme_credit sme_marketing sme_RD
sme_technology sme_govtPolicy sme_socialrelations sme_suggest_recommen
/METHOD WARD
/MEASURE=SEUCLID
/PRINT SCHEDULE CLUSTER(2,4)
/PRINT DISTANCE
/PLOT VICICLE.
```

Figure 3: Experiment Information (Data Validation)

Case Processing Summary ^a					
Valid		Missing		Total	
N	Percent	N	Percent	N	Percent
10	100.0	0	.0	10	100.0

a. Ward Linkage

Figure 4: Experiment Information (Proximity Matrix)

Proximity Matrix										
Squared Euclidean Distance										
Case	1	2	3	4	5	6	7	8	9	10
1	.000	1.440	1.440	1.140	1.390	1.390	1.170	1.300	1.300	1.300
2	1.440	.000	1.620	1.500	1.630	1.630	1.890	1.720	1.720	1.720
3	1.440	1.620	.000	1.680	1.630	1.630	1.890	1.720	1.720	1.720
4	1.140	1.500	1.680	.000	1.330	1.330	1.770	1.420	1.420	1.420
5	1.390	1.630	1.630	1.330	.000	1.620	1.900	1.710	1.710	1.710
6	1.390	1.630	1.630	1.330	1.620	.000	1.900	1.710	1.710	1.710
7	1.170	1.890	1.890	1.770	1.900	1.900	.000	.910	.910	.910
8	1.300	1.720	1.720	1.420	1.710	1.710	.910	.000	1.620	1.620
9	1.300	1.720	1.720	1.420	1.710	1.710	.910	1.620	.000	1.620
10	1.300	1.720	1.720	1.420	1.710	1.710	.910	1.620	1.620	.000

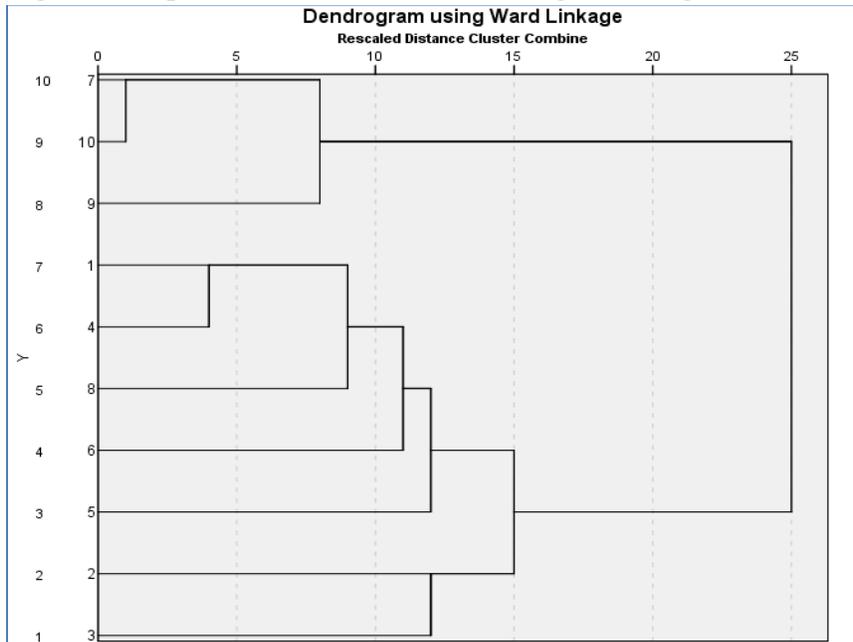
Figure 5: Experiment Information (Ward Linkage algorithm)

Ward Linkage						
Agglomeration Schedule						
Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	7	10	.455	0	0	3
2	1	4	1.025	0	0	4
3	7	9	1.717	1	0	9
4	1	8	2.433	2	0	5
5	1	6	3.219	4	0	6
6	1	5	4.015	5	0	8
7	2	3	4.825	0	0	8
8	1	2	5.715	6	7	9
9	1	7	6.925	8	3	0

Figure 6: Experiment Information (Cluster Membership)

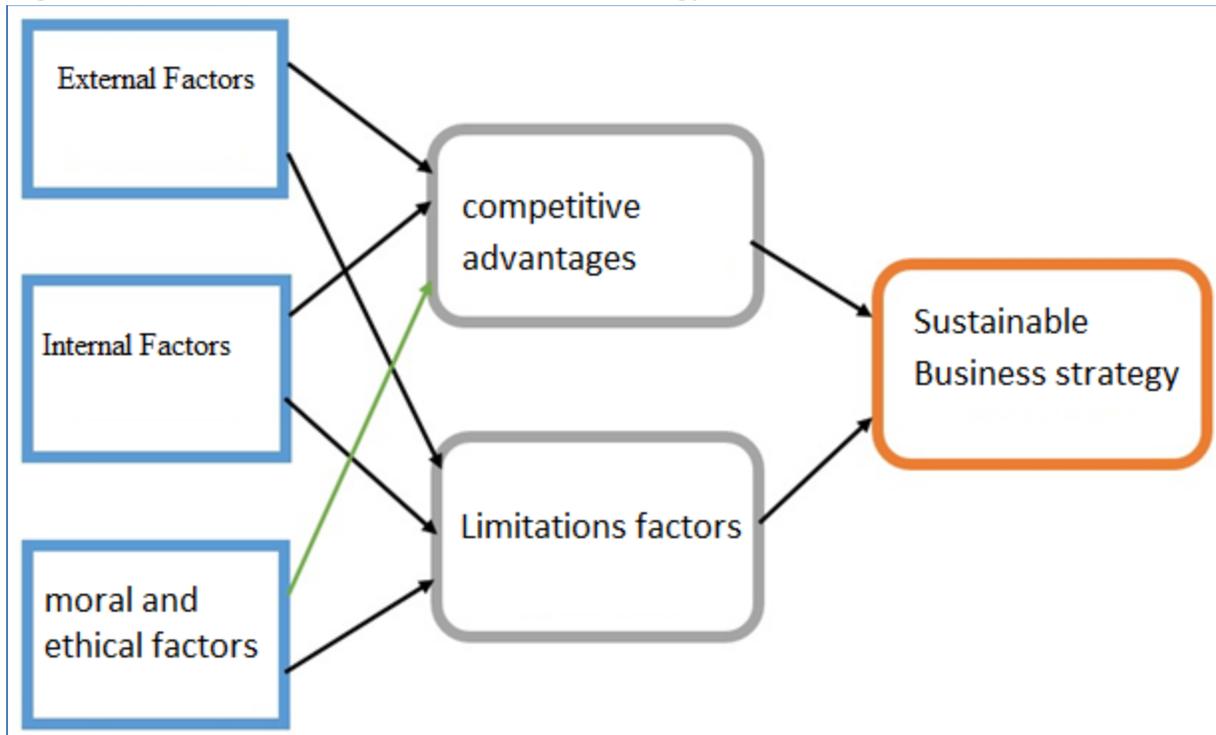
Cluster Membership				
Case	4 Clusters	3 Clusters	2 Clusters	
1	1	1	1	1
2	2	2	2	1
3	3	2	2	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	4	3	3	2
8	1	1	1	1
9	4	3	3	2
10	4	3	3	2

Figure 7: Experiment Information (Dendrogram using Ward Linkage)



From the Experiment interrelationship between the external factors, internal factors and moral & ethical factors Figure 8 is generated and further demonstrates the new generated model of interrelationship among various factors.

Figure 8: New Model of Sustainable Business Strategy



The above model demonstrates that external factors and internal factors directly influencing competitive advantage over other businesses operating in the same market and the third factor (Green arrow) affects indirectly. But the limitation of business opportunities can be influenced by all three factors directly.

FACTORS AFFECTING STRATEGY

External Environment Factors

The external environment is an environment in which a business exists and operates; it is a combination of all factors outside the business which directly affects its activities.

The most important factors that influence the business strategy are:

- socio-political conditions in which the business exists;
- governing laws, regulations and rules in which the business exists;
- market opportunities, its size, risk levels, competition conditions;
- interaction with suppliers of raw materials, other materials and components;
- interaction with consumers of business products;

-
- interaction with competitors;
 - impact of scientific and technological progress

External factors impose a number of restrictions on the business strategy, but, with proper adaptation it can provide small businesses with significant advantages over competitors. The success of a business depends largely on the interaction within the environment. The success or failure of business directly depends on how timely an entrepreneur materialises the available opportunities and foresees precarious trends in it.

Internal factors

Internal factors are all the factors and processes within the organisation affecting its milieu. Internal factors include:

- strengths and weaknesses of the business;
- competitive business advantages;
- personal ambitions of business owners;
- the structure of the business, its ability to restructure and adapt to environmental changes;
- technological capabilities;
- economic opportunities and financial management;
- business management;
- business efficiency;
- interaction with business partners, availability of qualified/skilled personnel

Internal factors can impose a number of restrictions on a business strategy, but, if used effectively, can provide small businesses with significant advantages over competitors. The prime focus is to use the available resources efficiently and economically.

Moral and ethical factors

Moral and ethical factors include:

- moral values accepted in society;
- personal moral qualities of business owners;
- the corporate culture of both the business itself, and its owners and managers



Moral factors play, as a rule, a limiting role in business strategy. The desire to tell the truth, not to deceive partners and their employees like underpayment of salaries, behaviour with suppliers, customers etc. are some examples of moral and ethical behaviour. Undoubtedly, these limiting factors have long term effect on the business.

CONCLUSION

To be successful in the volatile business environment, various strategies ought to be adopted by the SMEs. Advertisements should be given from time to time for awareness and popularity. Social media must be extensively used for marketing. Product planning must be done, competitive pricing must be adopted, and frequent offers should be given. Product demand must be developed and alternative products must also be searched out as per the need and demand of the consumers.

Diversification in products is also a successful strategy which must be adopted. Product quality must be maintained. Product-depth must be worked out and expansion planning must be done. Cost-efficiency strategies must be sought as traditional cost cutting is not very effective. Wastage must be eliminated, quality control must be adopted. Strategic business planning must be adopted, long term and short term vision should be clear, long term planning should be done, Capital budgeting and fund flow must be analysed.

Professional help must be exploited. A basic course on accounting & finance, management and marketing is a necessity for all the businesses. For this purpose, collaboration may be sought with colleges and universities for management development programs. Basic computer skills are also essential, like working on excel sheets, mailing, internet surfing to be updated with news, innovation, customer demand, product availability in market etc. Adoption of new technology is indispensable, those lacking behind will suffer. Young members of family must be involved in exploiting technology in the case of family businesses and professional help must be taken. More public speaking, bilingual, Arabic and working knowledge of English language is an added advantage for the business owners and more discussions, talks, in-field learning will increase their success rate.



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