THE RELATIONSHIP BETWEEN TECHNOLOGY AND COMPETITIVE ADVANTAGE: THE CASE OF VEGETABLES AND ANIMAL OILS AND FATS MANUFACTURERS IN KENYA

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DECLARATION

This Management Project is my own original work and has not been presented for a degree in any other University.

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This Management Project has been submitted for examination with my approval as the University Supervisor.

Signed: 10/11/2003

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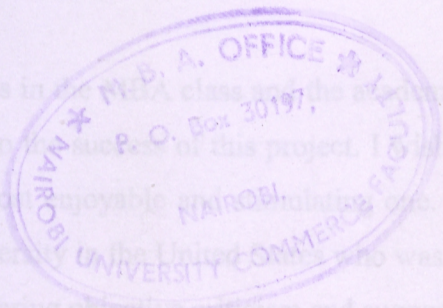
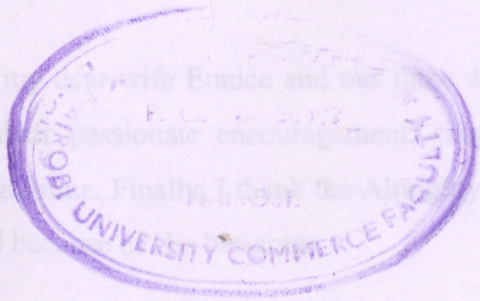
DEDICATION

To my parents Joshua and Truphena, brothers, sisters, wife and children with all my love





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Prologue

"One machine can do the work of fifty ordinary men. No machine can do the work of one extraordinary machine"

- ***Elbert Hubbard***

Managing Change

"When a hunter chases a rabbit, it zig-zags. When you chase peace it zig-zags too, and so must you. My policies often change, sometimes radically, but so do circumstances. I like to think of myself as one of those people who adapt themselves to changing circumstances, who react to the changes, and who sometimes help create them"

- ***Moshe Dayan, 1916 - 1981***

ABSTRACT

Technology by its very nature is significant in determining the level of efficiency of machines and ways of operation of organisations. The business environment is dynamic. Technology is a core competence resource which all modern companies require for their survival and success in business. In order for manufacturing firms to be more competitive than their rivals, there is need for them to invest more in appropriate technology that will put them ahead of their competitors.

This study set out to identify the types of core technologies used among Kenyan firms in the vegetables and animal oils and fats manufacturing industry and also to determine whether there is a link between technology and competitive advantage and the factors influencing them.

Primary data was collected using closed ended questionnaire from a census of 33 firms. Some of the companies have closed down and only 10 of them responded to the questionnaire. The data was thereafter analysed using percentages, cross tabulations, factor analysis and correlation matrices. The analysis revealed that most of the firms (70%) used both process and product technologies to differentiate their products from those of their competitors; reduce their costs and focus on their customers' needs competitively. The study also established that there is a positive and dynamic link between the technology used and competitive advantage of the firms.

Competitive advantage is not only the sum total of intellectual parts of the organisations, it is the speed of technological change. As the pace of innovations, competition and obsolescence increases, the speed of a manufacturing company's new technology adaptation becomes a benchmark challenge for leveraging innovation into success in all industries.

Technology and firm competitiveness is about realigning processes. It is about creating value and reducing wastage. It about sustaining a culture of continuous improvement and making technology work for the firms, not them working for technology. At the end of it all, rather than being stretched to the limit, the manufacturers shall find themselves more relaxed, proud enthusiastic and productive, on top of things, and will improve processes again and again, embracing and leveraging change for their benefit rather than dreading it.

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ABBREVIATIONS

CBS	- Central Bureau of Statistics
COMESA	- Common Market for East and Southern Africa
CPC	- Corn Products Corporation Kenya Ltd
ICTs	- Information and Communications Technologies
IT	- Information Technology
INES	- International Enterprises
KAM	- Kenya Association of Manufacturers
KES	- Kenya Shillings
KM	- Knowledge Management
MT	- Metric Tonnes
PESTEL	- Political, Economic, Social, Technological, Environmental and Legal
PC	- Personal Computer
R&D	- Research and Development
TC	- Technology Commercialisation
WWW	- World Wide Web

CHAPTER ONE

INTRODUCTION

1.1 Background

Firms are social entities that are goal-directed, deliberately structured activity systems with identifiable boundaries (Bedeian, 1980). Firms operating in a turbulent business environment face a lot of competition from other firms within the same industry. The manufacturing industry is machine-intensive that uses technology to process its products for its end-customers.

The term technology has been defined differently by various authors. Narayanan (2001) takes Webster's dictionary definition which includes: the branch of knowledge that deals with industrial arts, applied science, or engineering; the terminology of an art or science; or a technological process, invention, method or the like and some of the ways in which a social group provides themselves with the material objects of their civilisation.

The rapid pace of technological change is creating a wide array of new business opportunities especially in the manufacturing arena. For example, the development of the internet with its global reach and tens of millions of users is opening up possibilities for electronic banking, education on demand, digital photography, virtual shopping, and virtual factories; ultimately it has the potential to change almost every aspect of business life (Robson, 1997).

Organisations operate within a turbulent business environment. According to Johnson and Scholes (2001), environmental influences and trends can be thought of as being in layers around an organisation. The most general layer is the macro-environment where an understanding of political, economic, social, technological, environmental and legal influences (PESTEL) can provide an overall picture of the variety of forces at work around the organisation.

Strategy can be seen as the matching of the resources and activities of an organisation to the environment in which it operates. This is sometimes known as the search for *strategic fit*. The notion of **strategic fit** is developing strategy by identifying opportunities in the

business environment and adapting resources and competences so as to take advantage of these (Johnson and Scholes, 2001).

Ansoff (1990) defines strategic management as a systematic approach to a major and increasingly important responsibility of general management: to position and relate the firm to its environment in a way in which it will assure its continued success and make it secure from surprises.

Over the recent years, corporate organizations have revolutionised their operations in line with the dynamic business environments in order to be more competitive. Technology has enabled firms to achieve competitive advantage. Competitive advantage grows fundamentally out of value a firm is able to create for its buyers that exceeds the firm's cost of creating it. Value is what buyers are willing to pay for, and superior value stems from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset a higher price.

Managers today should want their organizations to become world class, because it is essential to survive and succeed in the ever dynamic business environment. They do this through continuous innovation of their processes.

Competition is at the core of the success or failure of firms. Competition determines the appropriateness of a firm's activities that can contribute to its performance, such as innovations, a cohesive culture, or good implementation. Competitive strategy is the search for a favourable competitive position in an industry, the fundamental arena in which competition occurs (Porter, 1998).

When two or more firms compete in the same market, the firm that possesses a competitive advantage over its rival returns a consistently higher rate of profit, or has the *potential* to earn a consistently higher rate of profit. *Competitive advantage* is the ability of the firm to outperform rivals on profitability. Competitive advantage depends on how a firm is able to create for its customer's value that exceeds the firm's cost of creating a product. Value is what the customers are willing to pay, and superior value stems from offering lower prices than or from providing unique benefits (Narayanan, 2001:14).

In 1987, the American National Research Council defined management of technology in the following way:

> "Management of technology links engineering, science and management disciplines to plan, to develop, and to implement technological capabilities to shape and accomplish the strategic and operational goals of an organisation"

Thus, management of technology focuses on the principles of strategy and organisation involved in technology choices, guided by the purpose of creating value for investors (Narayanan, 2001).

Aosa (1992) established that contextual factors have an impact on managerial processes. He further acknowledged that most African countries import technology and that organisations in these countries mainly acquire technology that has been developed elsewhere. It is important that these organisations be able to identify their technology needs, know the alternatives available, their values and where to get the technologies they are seeking.

Technology has been used extensively by various companies to meet strategic, tactical and operational needs. Choosing the right type of technology for a given business environment can mean the difference between competitors in an industry in ensuring that a firm satisfies all its customers more profitably than their business rivals. This is even more pronounced in the manufacturing sector of any country's economy.

1.2 Statement of the research problem

Within the international context, the *manufacturing sector* in Kenya is characterised by low relative value added, high relative employment, low export volumes and relatively low wages. In 1996, the sector employed about 13% of the total employment in the modern sector, and had a value added of 13% of the monetary economy's GDP (Republic of Kenya, Economic Survey 1997).

To compete in any industry, companies must perform a wide array of discrete activities such as processing orders, calling on customers, assembling products, and training employees. These activities are narrower than traditional functions such as marketing or R&D. However, they generate cost and create value for buyers and are the basis of competitive advantage (Porter, 1998).

Firms operate in a dynamic business environment. A number of forces in the environment affect businesses in varied ways and influence their competitiveness. These forces bring about uncertainty for the manufacturing organisations, in their quest for success and survival.

According to Johnson and Scholes (2002), three layers of business environment exist; the strategic group, the industry and the macro-environment. The macro-environment consists of broad environmental factors that impact to a greater or lesser extent on almost all organisations. It is important to identify these issues and particularly those that are likely to have a differentially large impact on a specific organisation or firm. The PESTEL framework helps in this aspect since it looks at the way in which future trends in the Political, Economic, Social, Technological, Environmental and Legal environment might impinge on organisations.

Current models of competitive advantage emphasize economic and socio-cognitive factors as explanations for a firm's success but ignore technological factors (Rindova, 1999). This survey seeks to find out the contribution of technology as an important external business environmental factor in the success or otherwise of a manufacturing firm's corporate or business strategy in enhancing its competitiveness.

Afuah (2002) asserts that attaining and sustaining a competitive advantage is fundamental to strategy. The research in resource-based view of the firm has identified those characteristics of resources and capabilities that underlie a firm's competitive advantage. However, very little progress has been made in providing empirical evidence as to the role of intangible resources such as technology in achieving competitiveness within developing countries, Kenya included.

Technological resources, in particular, have been the focus of many studies of firm specific advantages (for example, Cantwell, 1989), though research has also considered manufacturing, marketing, organizational and human resources (Birkinshaw, 1998).

In recent years, companies have increased their use of internal and external sources in pursuit of a competitive advantage through the effective and timely commercialization of new technology (Zahra, 2002). Grounded in resource-based view of the firm, this study examines the effect of a company's use of internal and external sources on multiple

dimensions of successful technology commercialization and its relationship with competitive advantage of the manufacturing firm.

Studies that have been done on firm competitiveness and Information Technology in Kenyan firms include Nyamwange (2001) and Abwao (2002). Nyamwange (2001) studied operational strategies pursued by large manufacturing firms in Kenya to achieve competitiveness and survive in the turbulent 'libero-global' environment. His focus was on the operational strategies. On the other hand Abwao (2002) dwelt on the role of Information Technology in the different levels of management specifically, on the extent to which computers are applied in business management in the private sector with special emphasis in the insurance industry.

The rapid, discontinuous and turbulent business environment in Kenya, demands that firms continually assess the way they do their businesses to add value to their customers faster, more competitively and profitably. This can be achieved through the application of appropriate technology by manufacturers. However, the researcher is not aware of any study that looks at the types of technology adopted among the manufacturers of food products especially those in the vegetables and animal oils and fats industry and the link between technology and competitive advantage among Kenyan firms.

Therefore, the questions that this study seeks to address are:

Which types of core technologies are applied by the vegetables and animal oils and fats manufacturing firms in order to be competitive in their industry? What is the link between the various technologies and competitive advantage? What factors technological influence this link?

From the perspective of this study, *competitive advantage is the key to long – term value creation* and is considered to be the major objective behind the management of technology decisions.

1.3 An Overview of Kenya's Manufacturing Sector

Kenya's industrial and manufacturing sector is going through a transition. This is largely as a result of the structural reform process which the Government of Kenya has been implementing for the last few years with a view to improving the economy. According to the Manufacturers' directory 2002 edition, the manufacturing sector remained depressed in 1999 due to lack of effective demand for locally manufactured products, high input costs, power rationing and poor infrastructure. The manufacturing sector in Kenya contributed an average of 13 per cent to the Gross Domestic Product (GDP) from 1995 to 1999. The growth rate of the sector however declined from 3.9 to 1.0 per cent for the same period. The above trend is mainly attributed to stiff competition from imports; poor infrastructure; reduced investments in the sector partly caused by high cost of domestic funds and reduced direct foreign capital investments and capital. This affects firm competitiveness in some way or another.

Historically, Kenya's manufacturing industry went through a long period of import substitution industrialisation during the 1970s, 80s and 90s with the lead having been taken by public sector enterprises. This resulted in domestic market industrialisation. The consequences were wide ranging and included technical inefficiencies, inconsistencies and lack of dynamism brought about by an overly regulated regime, poor industrial competitiveness manifested by the poor export performance, ageing equipment and inability to replace the same and general inability to expand the scale of operations. These effects of strategy are still evident in the economy to date.

According to Kenya's Economic Survey, 2003 the real output in the manufacturing sector expanded by 1.2 per cent in 2002. Among other factors that contributed to the good manufacturing performance was the stable macro economic environment during the year under review. The growth in the manufacturing sector was attributed mainly to rise in output of the food processing industries.

1.4 Objectives of the study

This study aims to:

i. Identify the types of core technologies used among Kenyan firms in the vegetables and animal oils and fats manufacturing industry.

ii. Determine whether there is a link between the type of technology and competitive advantage and the technological factors influencing them.

1.5 Importance of the research study

The project findings would be important to several stakeholders namely:

i. The government of Kenya that needs to provide an enabling environment for appropriate technology advancement and application in all sectors of the economy especially the manufacturing sector;

ii. Firm managers particularly top level management of firms in the oils and fats industry who need to develop organisational framework for innovating new technologies that can enhance firms' competitiveness and effectiveness;

iii. Researchers of technology, firm competitiveness and environment in the fats and oils industry as a basis for their future researches and;

iv. The strategic management practitioners and consultants to appreciate the extent to which various technologies and environment interact to contribute to competitive advantage of Kenyan firms

CHAPTER TWO

LITERATURE REVIEW

2.1 THE BUSINESS ENVIRONMENT

Since one of the main problems of strategic management is coping with uncertainty, it is useful to consider this in terms of organisations facing different contexts in their business environment. The environment encapsulates many different influences – the difficulty is making sense of this diversity. Managers view the pace of technological change and the speed of global communications to mean more and faster change (Johnson and Scholes, 2002).

According to Pearce and Robinson (1994) one set of factors in the remote or macro-environment involves technological change. To avoid obsolescence and promote innovation, a firm must be aware of technological changes that might influence its industry. Creative technological adaptations can suggest possibilities for new products, or in manufacturing and marketing techniques. A technological breakthrough can have a sudden and dramatic effect on a firm's environment. It may spawn new markets and products or significantly shorten the anticipated life of a manufacturing facility. Pearce and Robinson (1994), continue to argue that all firms and most particularly those in turbulent growth industries must strive for an understanding both of existing technological advances and probable future advances that can affect their products and services.

During the past thirty-five years, considerable attention has been directed to management of the research and development (R and D) process: its organization, its planning and control, its budgeting and, especially, the stimulation and management of creativity. However, the impact of technology on business strategies has received little recognition. Yet, in technology intensive industries, such as chemicals, electronics, pharmaceuticals, food processing or aerospace, technology is frequently a driving force, which determines the strategic future of the firm (Ansoff, 1990). Manufacturing firms also require the use of appropriate technology to increase their efficiency and improve the quality of their products.

Kotter (1995) lists the major economic and social forces driving change as: the increasing pace of technological advancements that is hinged on the information technology and a more developed transport network together with greater international integration. Kanter (1984) asserts that the phenomenal change in environment is originating from such sources as: the labour force, patterns of world trade, technological changes and political realignment.

The relationship between technology, innovation and strategic success is underscored. The key strategic issue is innovation, and technology should be seen as a means of underpinning innovation in organizations. But it is easy for organizations to get distracted by technology development itself without asking how the technology will assist in the creation and sharing of knowledge in an organization. Crucial is the question as to how this process will provide competitive advantage (Johnson and Scholes, 2002).

Burnes (1996:128) believes that while strategy, size, technology and environment define the minimum level of effectiveness and set the parameters within which self-serving decision choices will be made, both technology and environment are chosen. Thus, those in power will select technologies and environments that will facilitate their maintenance of control.

Ombiri (2001) contends that systems theory views organizations as systems whose core objective is growth, profitability and survival in a changing environment. Technological advancement, economic recession, consumer awareness, culture convergence, law, and competitor activities are some of the volatile forces that most businesses have to cope with.

In a dynamic and complex business environment, technology has become a key resource and yet expensive. It is costly to acquire and disburse. A revolution in technology is more complex and impactful on systems, and this offers opportunities and/or threats to the firms. Therefore, its strategic use for positioning a firm competitively should not be taken for granted. It is particularly important that PESTEL is used to look at the future impact of environmental factors, which may be different from their past impact (Johnson and Scholes, 2001:102).

Technological environment is thus a major segment of the macro environment. This segment is interlinked with other macro environmental segments; nevertheless, it constitutes the primary environmental segment influencing the management of technology. The technological environment is the most visible and pervasive macro environmental segment in the society for three reasons: it brings new products, processes and materials; it directly impacts every aspect of the society around us – for example transportation modes, energy, communications, entertainment, health care, food, agriculture and industry and alters the rules of global trade and competition (Narayanan, 2001).

2.2 Overview of Vegetable oils, animal oils, and fats sector

The manufacturing industry in Kenya consists of three main sectors: the agro-based, the engineering and construction and the chemical and mineral sectors.

The agro-based sector consists of among others, the food processing sector. The sector contributes 68% of value added from the manufacturing industry in Kenya. Firms in this sector specialise in the manufacture and marketing of food and related products. These firms produce high quality consumer goods such as the edible oils also known as vegetables and animal oils and fats for cooking (KAM Directory, 2002).

The companies use certain technologies to manufacture different vegetables and animal oils and fats for customers with varied needs. This study explores the relationship between the type of technology used and competitive advantage of the manufacturers of vegetables and animal fats and oils.

Table 2-1: Key Economic and Social Indicators

Description	Units	1998	1999	2000	2001	2002
Population	Million	28.8	29.5	30.2	30.8	31.5
GDP at market prices	KES mn	694,028.7	743,478.6	796,342.9	882,725.0	969,353.9
GDP per capita (Current)	KES mn	20,747.7	21,736.6	22,690.6	24,987.9	26,998.4
Manufacturing output	KES mn	703,000.0	742,500.0	661,200.0	669,600.0	684,700.0
Trade balance	KES mn	-76,608.1	-83,841.6	-113,276.8	-142,518.0	-88,426.7

Source: Economic Survey 2003/ Central Bureau of Statistics p.10

Table 2.1 shows that during the period 1998 to 2002, the population of Kenya increased at a compound rate of 2.27% while GDP at market prices rose at 9.81% and the manufacturing output fluctuated at between 5.6% and -11%.

As a result of the foregoing economic situation, the country increased the quantity of its imports by 87% over the same period (Table 2.3) to offset any shortage of vegetable/animal oils and fats.

Table 2.2: Quantum Index of Manufacturing Production, 1998–2002 (1976 = 100)

INDUSTRY	1998	1999	2000	2001	2002	% change 2002/2001
Meat and Dairy Products	76.4	84.3	85.9	86.1	88.6	2.9
Canned Vegetables, fish, oils and fats	325.2	372.9	391.8	423.3	431.2	1.9
Grain Mills Products	202.7	200.9	157.6	143.1	148.9	4.1
Bakery products	352.2	345.2	295.5	299.9	304.4	1.5
Sugar and confectionery	226.6	236.6	206.1	195.2	223.7	14.6
Miscellaneous foods	240.0	227.8	246.4	262.3	247.2	-5.8
Food manufacturing	200.1	204.9	199.4	200.8	208.5	3.9
Beverages	204.7	155.2	166.4	157.9	165.7	4.9
Tobacco	202.5	192.7	160.2	155.9	158.6	1.7
Beverages and Tobacco	203.7	159.7	166.1	158.2	165.4	4.5
Textiles	118.6	118.7	115.5	114.7	114.9	02
Clothing	148.4	154.8	167.2	172.8	178.4	3.2
Leather and Footwear	57.9	48.6	54.6	59.5	61.6	3.5
Wood and Cork Products	73.4	82.3	75.1	71.7	31.6	-56.0
Furniture and Fixtures	55.9	55.9	56.1	57.0	51.3	-10.0
Paper and Paper Products	222.3	238.1	258.5	263.3	262.5	-0.3
Printing and Publishing	465.9	466.4	424.5	424.5	447.3	5.4
Basic Industrial Chemicals	168.8	162.6	140.6	147.1	136.3	-7.4
Petroleum and Other Chemicals	594.8	616.8	659.4	741.8	757.0	2.0
Rubber Products	668.3	590.8	588.1	581.1	548.5	-5.6
Plastic Products	608.7	697.6	781.8	837.0	919.3	9.8
Clay and Glass Products	2437.0	1623.0	1191.7	1052.4	1049.8	-0.3
Non- Metallic Mineral Products	216.7	216.9	153.8	139.1	137.0	-4.1
Metallic Products	252.9	270.1	238.1	237.7	228.7	-3.8
Non-Electrical Machinery	86.7	85.1	86.1	89.1	86.2	-0.3
Electrical Equipment	221.9	188.4	188.7	199.4	195.5	-2.0
Transport Equipment	433.3	360.1	241.5	212.6	227.7	7.1
Miscellaneous Manufacturers	765.2	917.5	917.5	1149.6	1190.9	-1.7
TOTAL MANUFACTURING	**282.2**	**285.6**	**281.4**	**283.6**	**287.0**	**1.2**

Source: Economic Survey 2003/ Central Bureau of Statistics p.170

Production indices of the manufacturing sector are outlined in table 2.2. As shown in the table, the majority of the industries recorded growth albeit only modest. The food processing industry that accounted for 13.1 per cent of the total manufacturing output in 2002 recorded a 3.9 per cent growth mainly due to increased sugar output.

The canned vegetables, fish, oils and other fats sub-sector recorded a slower growth output of 1.9 per cent in 2002 compared with an 8.0 per cent growth rate recorded in 2001. Stable prices in the local market and the growing regional market continued to sustain the growth in the sub-sector. Production of edible fats and margarine was 144.2 thousand tonnes in 2002 slightly above 143.4 thousand tonnes produced the previous year. Total export of cooking fat was 43.1 thousand tonnes, 47.6 per cent above 29.2 thousand tonnes exported the previous year. During the period under review production of edible oils went up by 13.8 per cent to reach 30.4 million litres from 26.7 million litres in 2001 (Economic Survey 2003:170).

Table 2.3: Quantities of imports and exports of animal/vegetable oils and fats (1998-2002)

	1998	1999	2000	2001	2002
Exports in MT	40,751	31,651	23,056	29,161	43,063
Imports in MT	217,048	263,956	270,450	407,488	406,106

Source: Economic Survey 2003/Central Bureau of Statistics p. 111

Table 2.3 shows that while the exportation of animal/vegetable oils and fats stabilised for the period from 1998 to 2002 with only an increase of 5.7%, the quantity of imports increased tremendously by 87%. This means that while the demand for the cooking oils and fats has increased drastically, the manufacturers have are yet to much it with the appropriate consumer products.

Table 2.4: Value of imports and exports of animal/vegetable oils and fats (1998-2002)

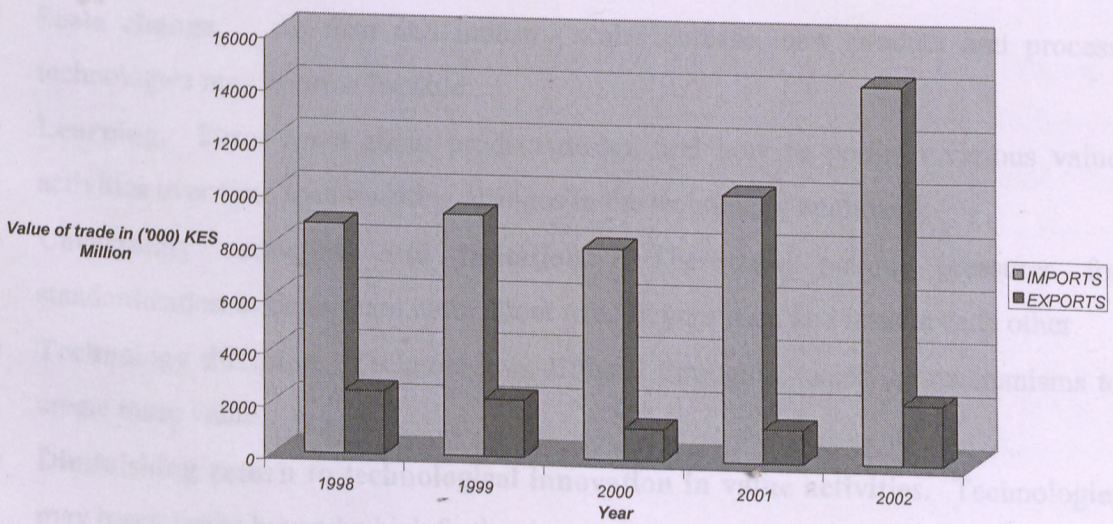
	1998	1999	2000	2001	2002
Exports (Kshs million)	2,396	2,186	1,204	1,298	2,277
Imports (Kshs million)	8,750	9,184	8,016	10,125	14,333

Source: Economic Survey 2003/Central Bureau of Statistics p. 113

From table 2.4 it can be noted that in 1998, the country imported three and half times what it exported as vegetables/animal oils and fats. By year 2002, the country's imports were six times its exports. This is a significant value in Kenya's international trade. It is also notable that while exports declined by 5%, imports rose by 64% over the same period. Export price indices for animals and vegetables oils and fats went up by 31.0 per cent. Import price indices for animals and vegetables oils and fats rose considerably by 39.3 per cent. Import values for animal/vegetable fats and oils rose by 41.6 per cent.

This was graphically represented here below:

Figure 2.1: Vegetable/Animal fats and Oils Balance of Trade, 1998-2002



Source: Data obtained from Economic Survey 2003/ Central Bureau of Statistics

The value of imports and exports is represented in Figure 2.1. The value of exports have either remained constant or declined over the years, while that of imports has risen steadily

over the same period. The higher import values of animals and vegetable oils and fats were occasioned by increases in both their quantities and unit prices.

2.3 Technological Evolution

Since technological change has such a powerful role in competition, forecasting the path to technological evolution is extremely important to allow a firm to anticipate technological changes and thereby improve its position. Most research on how technology evolves in an industry has grown out of the product life cycle concept. According to the life cycle model, technological change early in the life cycle is focused on product innovations, while the manufacturing process remains flexible. As an industry matures, product designs begin to change more slowly and mass production techniques are introduced. Process innovation takes over from product innovation as the primary form of technological activity, with the aim of reducing the cost of an increasingly standardized product. Finally, all innovation slows down in later maturity and declines as investments in the various technologies in the industry reach the point of diminishing returns (Porter, 1998).

Technological evolution in the manufacturing industry results from the interaction of a number of forces:

- **Scale change.** As firm and industry scale increase, new product and process technologies may become feasible.
- **Learning.** Firms learn about product design and how to perform various value activities over time with resulting changes in the technology employed.
- **Uncertainty reduction and imitation.** There are natural pressures for standardization as firms learn more about what buyers want and imitate each other.
- **Technology diffusion.** Technology is diffused through a variety of mechanisms to create more value.
- **Diminishing return to technological innovation in value activities.** Technologies may reach limits beyond which further improvement is difficult.

The product life cycle pattern of technological evolution would result if these forces interacted in the following way. Through successive product innovation and imitation, the uncertainty about appropriate product characteristics is reduced and a dominant design emerges. Growing scale makes mass production feasible, reinforced by the growing product standardization. Technological diffusion eliminates product differences and

compels process innovation by firms in order to remain cost competitive. Ultimately, diminishing returns to process innovation set in, reducing innovative activity altogether (Porter, 1998).

Continuous Versus Discontinuous Technological Evolution

The pattern of technological evolution differs widely among industries based on whether technological change is incremental or subject to discontinuity. Where there is incremental technological change, the process is more likely to be determined by action of industry participants or spin-off from these participants. External sources of technology are likely to be existing suppliers to an industry (Porter, 1998).

Porter further contends that technological discontinuity creates the maximum opportunity for shifts in relative competitive position. It tends to nullify many first mover advantages and mobility barriers built on the old technology. Discontinuity also may require wholesale changes in the value chain rather than changes in one activity. Hence a period of technological discontinuity makes market positions more fluid, and is a time during which market shares can fluctuate greatly.

Forecasting Technological Evolution

A firm can use this framework to forecast the likely path of technological evolution in its industry. With some insight into the likely pattern of technological evolution a firm may be able to anticipate changes and move early to reap competitive advantages. However, there will always be uncertainty wherever technology is involved. Uncertainty over future technological evolution is a major reason why a firm may to employ industry scenarios in considering its choice of strategies (Porter, 1998).

Technological change has had a profound effect on most industries and occupations during the 1980s and 90s. The Skill Needs in Britain (1997) survey identified changes in processes and / or technology as the most common factor causing an increase in the skills demanded by the employers of their employees (actual or potential). Advances in technology have provided software applications that are becoming more user-friendly. There is however, firm evidence of not only severe shortages in IT specialisms, but also an inadequate continuum of skills throughout the workforce, with companies reporting increased difficulties in recruiting and retaining ICT literate staff.

2.4 Types of technology

According to Porter (1998), any firm involves a large number of technologies. Everything a firm does, involves technology of some sort, despite the fact that one or more technologies may appear to dominate the product or the production process. The significance of a technology for competition is not a function of its scientific merit or its prominence in the physical product. Any of the technologies involved in a firm can have a significant impact on competition. A technology is important for competition if it significantly affects a firm's competitive advantage or industry structure.

The argument for technology being a key variable follows similar lines to that of environment. Organisations creating and providing different products and services use different technologies. Indeed, even those producing similar products like food processors may use differing techniques. Given that these technologies can vary from the large and expensive, such as edible oils manufacturing lines, to the relatively small and cheap, such as a personal computer, the form of organisation necessary to ensure their efficient operation will also vary (Burnes, 1996:60).

Porter (1998) argues that technology is embodied not only in primary activities but in support activities as well. Computer-aided design is an example of a technology just coming into use in product development that is replacing traditional ways of developing new products. Various types of technologies also underlie the performance of other support activities, including those not typically viewed as technologically based. Procurement embodies procedures as well as technologies for placing orders and interacting with suppliers. Recent developments in information systems technology offer the possibility of revolutionizing procurement by changing ordering procedures and facilitating the achievement supplier linkages. Human resource management draws on motivation research and technologies for training. Firm infrastructure involves a wide range of technologies ranging from office equipment to legal research and strategic planning.

2.5 Value Chain and Competitive Advantage

Competitive advantage cannot be understood by looking at a firm as a whole. It stems from the many discrete activities a firm performs in designing, producing, marketing, delivering, and supporting its product. Each of these activities can contribute to a firm's relative cost position and create a basis for differentiation. A systematic way of examining all the activities

a firm performs and how they interact is necessary for analyzing the sources of competitive advantage. The value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation. A firm gains competitive advantage by performing these strategically important activities more cheaply or better than its competitors (Porter, 1998).

The figure below illustrates the various types of technologies available and applicable in a firm as embodied in a value chain analysis.

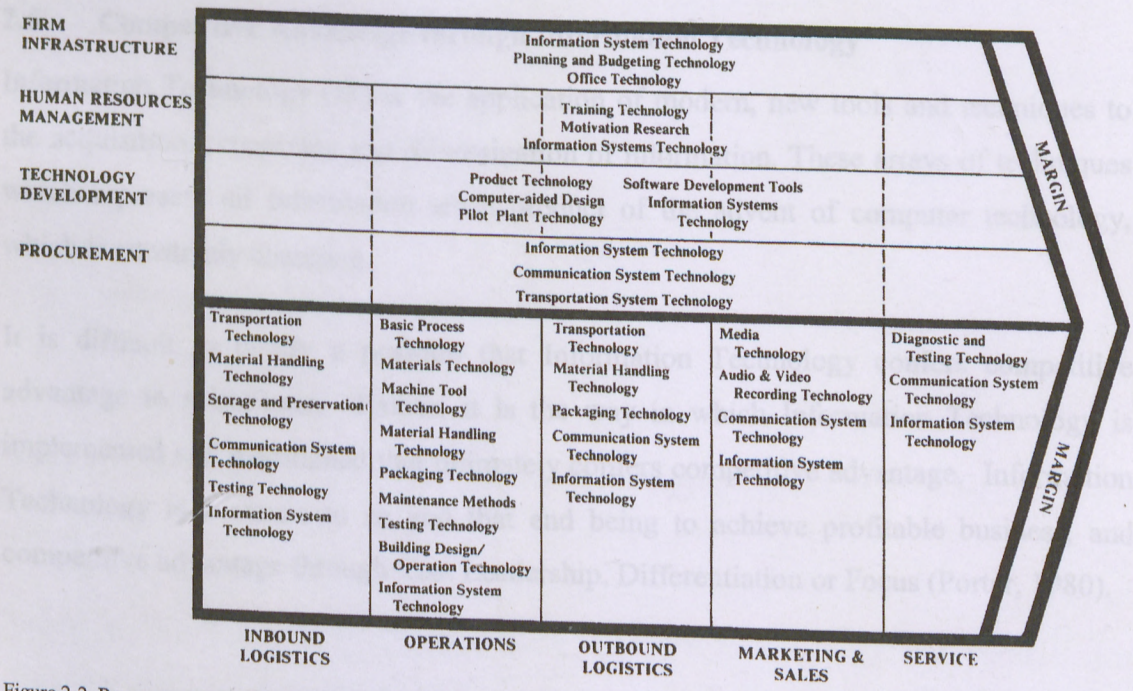


Figure 2-2. Representative Technologies in a Firm's Value Chain

Source: Adapted from Michael Porter Competitive Advantage; Creating and Sustaining Superior Performance (Page 167)

According to Porter (1998), ***Information systems technology*** is particularly pervasive in the value chain, since every value activity creates and uses information. This is evident from Figure 2-2, which shows information systems technology in every generic category of value activity in the chain. Information systems are used in scheduling, controlling, optimizing, measuring, and otherwise accomplishing activities. Information systems technology also has an important role in linkages among activities of all types, because the coordination and optimization of linkages requires information flow among activities. The recent, rapid technological change in information systems is having a profound impact on competition and competitive advantages because of the pervasive role of information in the value chain.

The technologies in different value activities can be related, and this underlies a major source of linkages within the value chain. ***Product technology*** is linked to the technology for servicing a product, for example, while ***component technologies*** are related to overall product technology. Thus a technology choice in one part of the value chain can have implications for other parts of the chain. In extreme cases, changing technology in one activity can require a major reconfiguration of the value chain. Linkages with suppliers and channel also frequently involve interdependence in the technologies used to perform activities (Porter, 1998).

2.6 Competitive Advantage through Information Technology

Information Technology (IT) is the application of modern, new tools and techniques to the acquisition, processing and dissemination of information. These arrays of techniques which represent all information are a product of the advent of computer technology, which is constantly changing.

It is difficult to justify a position that Information Technology confers competitive advantage to a business. Rather, it is the way in which Information Technology is implemented and maintained that ultimately confers competitive advantage. Information Technology is a means to an end that end being to achieve profitable business, and competitive advantage through Cost Leadership, Differentiation or Focus (Porter, 1980).

In order to assess the impact of the implementation of Information Technology, it is beneficial to refer to a widely accepted model of competitive advantage such as **Porter's five forces model** as shown in figure 2-3 below.

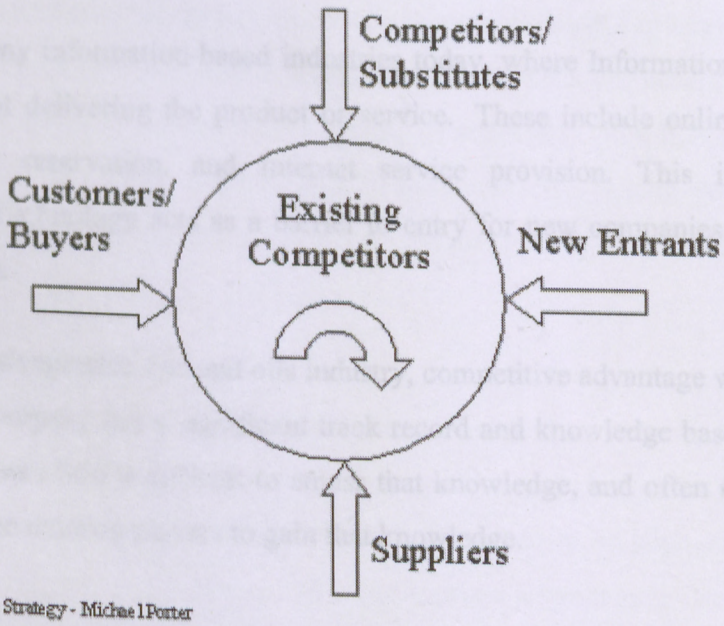


Figure 2-3: Porter's Five-Force Model

Source: **Porter, M.E.** (1980) The Structural Analysis of Industries, Competitive Strategy. New York: Simon and Schuster Inc.p3-33

Competitors

Today, in many manufacturing industries, competitors are many and varied - gas companies supply electricity, cable companies supply telephony, vegetables/animal oils and fats supply cooking fats and satellite companies supply Internet access. For many organisations, the very process of identifying competitors can be time-consuming, but can be optimised with the intelligent use of Information Technology. Relatively simple competitor analysis can be performed by searching the World Wide Web, giving advanced warning of organisations entering the market space, and allowing incumbents to take appropriate actions.

With Information Technology and increased market awareness, companies can track new product development and releases by their competitors. Beyond this, companies can use the capabilities of Information Technology to replicate new products launched by competitors, and to improve on them based on their own market intelligence. As Peppard (1993) discusses, a company must assess whether it wants to be a 'first mover' in IT, and run the risk of creating a market that will be plundered by followers with improved

products. In dynamic industries such as the PC market itself, this leads to a seesaw effect between leading players as to who is presenting a superior product.

New entrants

There are many information-based industries today, where Information Technology is a cornerstone of delivering the product or service. These include online banking, online airline ticket reservation, and Internet service provision. This intelligent use of Information Technology acts as a barrier to entry for new companies wishing to attack those markets.

In the animals/vegetable fats and oils industry, competitive advantage will be conferred if an existing company has a significant track record and knowledge base in that industry. New competitors find it difficult to amass that knowledge, and often resort to recruiting personnel from existing players to gain that knowledge.

Substitutes

In industries such as telecommunications and electricity, de-regulation has actively promoted the customers' ability to substitute one supplier for another. This combined with the globalisation of markets and the abolition of national boundaries, means that it is increasingly easy for suppliers to trade internationally and globally. Vegetables and animal oil and fats customers in all markets now have the ability to search for substitute products through the World Wide Web, increasing the threat of substitution for many suppliers.

Many suppliers in the vegetables and animal oil and fats processing industry have realised that in order to reduce the threat of substitution, more and more value added services must be wrapped around the product or services to ensure uniqueness. To achieve economies of scale, these services must be provided through IT, in the form of knowledge and information.

Suppliers

Especially in low margin industries, it is critical to control business costs, a large proportion of which may well be comprised of supplier costs. Information Technology, based around products such as SAP, can analyse material requirements, automatically

generate stock replenishment orders, and automatically generate stock delivery times, so that work in progress is minimised, resulting in lower stock overheads.

This just-in-time methodology, combined with the optimisation of materials handling as items move through the production process, means that variable overheads are minimised, resulting in an improved cost model and/or improved profits. Information Technology can also be used to assist in regular market testing of suppliers. Suppliers can be polled on a regular basis, to provide electronic input to the materials ordering system, allowing the most cost effective combination of price, product and service to be selected.

Customers

The rapid development of information management and processing has resulted in the ability to analyse the past market, the current market, and predict the future market with relative ease. This market analysis, performed by ever-more sophisticated Information Technology, allows a company to take appropriate commercial decisions on product lifecycle, and to integrate market requirements into future products.

As we progress through the information age, companies and their Information Technology will be expected to tailor products and services on demand by any single client. Some companies have addressed the marketing of additional products through the use of collaborative filtering, and are now using advanced techniques to analyse the path taken around the site in order to determine customers' interests.

The Internet by definition makes it easier for a client to investigate alternative products and alternative suppliers. In order to foster increased client loyalty, companies will have to investigate and employ methods of delivering even greater value added through Information Technology.

In IT Strategy for Business, Peppard (1993) highlights those companies that are competing through IT, by placing terminals at customer locations to improve customer service, and to allow the customer to check stock and place orders.

People and their knowledge

There are less tangible areas where Information Technology can confer competitive advantage. By providing employees with tools that they can use to improve their own

productivity, morale should increase, and the mission of the organisation should be accomplished more efficiently.

The ability to collate, interpret, and act upon this wealth of information confers competitive advantage and the ability to tailor products and services based on market demands. Based on accurate data entry, Knowledge Management Systems will provide marketing information on clients, competitor information to allow an appropriate strategy to be followed, and allow sensible business decisions to be made about allocation of resource, distribution of marketing budget based on the effectiveness of appropriate media, and the development of new products.

In an information-based market place, Information Technology will be used to assess the effectiveness of new products in real time. Whereas in previous years, a company would have user forums, user testing, and market research, in the information world users will give immediate feedback as to their likes and dislikes regarding a product which will allow that product to be altered, tailored, and remarketed in seconds.

2.7 Technology and competitive advantage

Technology affects competitive advantage if it has a significant role in determining relative cost position or differentiation. Since technology is embodied in every value activity and is involved in achieving linkages among activities, it can have a powerful effect on both cost and differentiation. Technological change is one of the principal drivers of competition. It plays a major role in industry structural change as well as in creating new industries. It is also a great equalizer, eroding the competitive advantage of even well-entrenched firms and propelling others to the forefront. Many of today's great firms grew out of technological changes that they were able to exploit. Of all the things that can change the rules of competition, technological change is among the most prominent (Porter, 1998).

Further, Porter (1998) adds that despite its importance, however, the relationship between technological change and competition is widely misunderstood. Technological change tends to be viewed as valuable for its own sake – any technological modification a firm can pioneer is believed to be good. Competing in "high technology" industries is widely perceived as being a ticket to profitability, while other industries that are "low-technology" are viewed with disdain. The recent success of foreign competition, much of

it based on technological innovation, has encouraged companies to invest even more in technology, in some cases uncritically.

Technological change is not important for its own sake, but is important if it affects competitive advantage and industry structure. Not all technological change is strategically beneficial; it may worsen a firm's competitive position and industry attractiveness. High technology does not guarantee profitability. Indeed, many high-technology industries are much less profitable than some "low-technology" industries due to their unfavourable structures. "Technology is an important KM tool; it facilitates capturing, storing, and accessing organizational knowledge. However, it is a mistake to think that technology will do all of the work. Technology by itself cannot (and will not) change a culture" (Duffy, 2000).

Technology, however, pervades a firm's value chain and extends beyond those technologies associated directly with the product. There is, in fact, no such thing as a low technology industry if one takes this broader view.

In the current business environment great technological turbulence is the order of the day and to achieve competitiveness, firms must formulate appropriate business strategies and add value to their current and potential customers.

While multinationals from developed countries tend to be on the frontier of technological sophistication through heavy expenditures in high output research and development programs, INEs from developing countries, like those from Brazil and India fill a niche by providing adapted technology. Adapting technology may sometimes require scaling it down to serve smaller markets in developing countries. The ability to adapt or sometimes reproduce a given technology and the ingenuity to modify it to particular circumstances constitute the main strengths of INEs from developing countries (Kochunny and Rogers, 1995:35).

2.8 Technology Strategy

Technology strategy is a firm's approach to the development and use of technology. Although it encompasses the role of formal research and development organizations, it must also be broader because of the pervasive impact of technology on the value chain. Because of the power of technological change to influence industry structure and competitive advantage, a firm's technology strategy becomes an essential ingredient in its overall competitive strategy. Innovation is one of the principal ways of attacking well-

entrenched competitors. However, technology strategy is only one element of overall competitive strategy, and must be consistent with and reinforced by choices in other value activities.

A technology strategy designed to achieve differentiation in product performance will lose much of its impact, for example, if a technically trained sales force is not available to explain the performance advantages to the buyer and if the manufacturing process does not contain adequate provisions for quality control (Porter, 1998).

Technology strategy must address three broad issues

- What technologies to develop
- Whether to seek technological leadership in those technologies
- The role of technology licensing

Choices in each area must be based on how technology strategy can best enhance a firm's sustainable competitive advantage.

2.9 The choice of Technologies to Develop

At the core of technology-strategy is the type of competitive advantage a firm is trying to achieve. The technologies that should be developed are those that would most contribute to a firm's generic strategy, balanced against the probability of success in developing them. Technology strategy is a potentially powerful vehicle with which a firm can pursue each of the three generic strategies. Depending on which generic strategy is being followed, however, the character of technology strategy will vary a great deal, as shown in Table 2-5 below (Porter, 1998).

In many manufacturing firms, research and development programs are driven more by scientific interests than by the competitive advantages sought. It is clear from Table 2-5, however, that the primary focus of a firm's Research and development programs should be consonant with the generic strategy that is being pursued. The Research and development program of a cost leader, for example, should include a heavy dose of projects designed to lower cost in all value activities that represent a significant fraction of cost, as well as projects to reduce the cost of product design through value engineering. Research and development by a cost leader on product performance must be aimed at maintaining parity with competitors rather than adding costly new features or the goals of Research and development will be inconsistent with the firm's strategy.

Another important observation from Table 2-5 is that both product and process technological change can have a role in supporting each of the generic strategies. Firms often incorrectly assume that process technological change is exclusively cost-oriented and product technological change is intended solely to enhance differentiation. Product technology can be critical in achieving low cost, while changes in process technology may be the key to differentiation (Porter, 1998).

TABLE 2-5 Product and Process Technology and the Generic Strategies

	COST LEADERSHIP	DIFFERENTIATION	COST FOCUS	DIFFERENTIATION FOCUS
		ILLUSTRATIVE TECHNOLOGICAL POLICIES		
Product Technological change	Product development to reduce product cost by lowering material content, facilitating ease of manufacture, simplify logistical requirements, etc.	Product development to enhance product quality, features, deliverability, or switching costs	Product development to design in only enough performance for the target segment's needs	Product design to meet the needs of a particular segment better than broadly-targeted competitors
Process Technological Change	Learning curve process improvement to reduce material usage or lower labour input Process development to enhance economies of scale	Process development to support high tolerances, greater quality control, more reliable scheduling, faster response time to orders, and other dimensions that raise buyer value	Process development to tune the value chain to a segment's needs in order to lower the cost of serving the segment	Process development to tune the value chain to segment needs in order to raise buyer value.

Source: Adapted from Porter, M.E (1998), Competitive Advantage: Creating and sustaining superior performance, The Free Press (page 178)

It is also important that a firm's technology strategy extend beyond product and process Research and development as they are traditionally defined. Technology pervades a firm's value chain and relative cost and differentiation are a function of the entire chain. Thus, a systematic examination of all a firm's technologies will reveal areas in which to reduce cost or enhance differentiation. The information system department may have more impact on technological change in some firms today than the Research and development department. Finally, development in all technological areas must be coordinated to ensure consistency and exploit interdependencies among them (Porter, 1998).

The section of specific technologies in the value chain on which to concentrate development effort is governed by the *link* between technological change and competitive advantage. A firm should concentrate on those technologies that have the greatest sustainable impact on cost or differentiation, either directly or through meeting the other tests described earlier. These tests allow a ranking of technological changes that would yield the greatest competitive benefit. The cost of improving the technology must be balanced against the benefit, as well as the likelihood that the improvement can be achieved (Porter, 1998).

The choice of technologies to develop should not be limited to those few where there are opportunities for major breakthroughs. Modest improvements in several of the technologies in the value chain, including those not related to the product or the production process, can add up to a greater benefit for competitive advantage. Moreover, cumulative improvements in many activities can be more sustainable than a breakthrough that is noticeable to competitors and becomes an easy target for imitation. The success of Japanese firms in technology is rarely due to breakthroughs, but to a large number of improvements throughout the value chain (Porter, 1998).

In conclusion, therefore, technology can undoubtedly play a part in achieving competitive advantage, as long as it is implemented in the interests of achieving business benefits, and achieving the corporate mission. As Peppard (1993) discusses, applications developments should be categorised and prioritised into strategic, key operational, support and high potential, and "those applications which are critical to future business success" should be created first, to confer competitive advantage.

It is of essence for a corporation to invest in appropriate technology if it is to cope with a competitive future. Technology is a valued corporate asset and is key to keeping astride with the changing business environment. The implementation of real time systems results to; changing working relationships within the organization; changing working relationships with partners and customers; changes the corporate culture due to application of technology; new ideas for services and products and new ways of gaining customer loyalty. To enable strategic success and survival in business, it is important to align the business and technology strategies appropriately. Successful organisations will be those where there is strong commitment to innovation from senior management and business acumen based on an understanding of business strategy and technology relationship.

CHAPTER THREE

RESEARCH METHODOLOGY

This part is divided into the following areas: research design, population of study, data collection methods and data analysis.

3.1 Research Design

A descriptive design was used in this survey. Churchill (1991:144) notes that a descriptive study can be used when the purpose is to:-

a) Describe the characteristics of certain goals

b) Estimate proportion of people who behave in a certain way

c) Make specific predictions

Descriptive design is therefore justified for this study since it includes an array of research objectives whose purpose is to determine the types of technology used to create competitive advantage while analysing the link between technology and competitive advantage in the manufacturing of animal/vegetable oils and fats.

The research design used for collecting data was the cross-sectional survey carried out at a single point of time involving all vegetables and animal fats and oils manufacturing firms in Kenya.

3.2 The population

The population of interest in this study consisted of all the 33 vegetables and animal oils and fats manufacturing companies in Kenya listed in the Kenya Association of Manufacturers' directory, 2002 edition (Appendix 111). Given the small size of this population, a census study was conducted.

3.3 Data collection method

Both primary and secondary data was collected. A self-reporting, semi-structured, questionnaire was used to gather primary data. The questionnaires were directed to the General Managers and Managing Directors and Heads of Departments or their representatives of the selected firms. Personally administered questionnaire was used to interview focused groups to establish the types of technologies used by their firms and their relationship to competitive advantage of the firms.

The questionnaires comprised two sections. Section A, covered general organisation profile. Section B, sought information on the types of technology used by the manufacturing firms and the link between the technologies and firm competitiveness.

3.4 Data analysis

The information was tabulated and cross- tabulated to indicate the types of technologies employed by the selected companies to enhance their competitive advantage and the link between technologies and competitive advantage for the manufacturers of edible oils and fats. The cross tabulation and frequencies also indicated the technological factors influencing the link.

The data was also analysed using descriptive statistics, factor analysis and non-parametric tests. Descriptive statistics was used to analyse data on the likert scale due to the qualitative nature of some aspects of the data. Correlation analysis and chi-square was also used to establish the relationship between technology and firm competitive advantage. Other studies that have used similar analysis are Kinyanjui (2001), Abwao (2002) and Ndung'u (2002).

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

In this section, the data from the completed questionnaires was summarized and presented tables and percentages. The analyses are presented in two parts. The first part deals with the general information captured in section A of the questionnaire. The second part aims at answering the earlier stated objectives.

4.1 Overview

The first step in the analysis was to give an overview of the data. This involved the tabulation of the questionnaires distributed and returned per location. This subsection of the analysis deals with section A of the questionnaire. These are presented in the table 4.1.

Table 4.1 Number of Questionnaires Distributed and Returned

Location of the firm	Number Distributed	Percentage	Number completed and returned	Percentage
Nairobi	16	49	10	59
Nakuru	5	15	2	12
Mombasa	5	15	2	12
Eldoret	2	6	1	5
Thika	2	6	2	12
Kisumu	1	3	0	0
Nyeri	1	3	0	0
Kisii	1	3	0	0
Total	**33**	**100**	**17**	**100**

Source: Research Data

From table 4.1 above, of the 33 companies targeted for study 17 of them responded and only 16 did not respond. This represented 52% response rate. The reasons for the 48% non-response were among others: outright refusal to respond to the questionnaire (3%); closure of

manufacturing operations (36%) and either change of nature of business or location (9%). Thus, out of the seventeen respondents, those actively involved in the manufacture and sale of animal and vegetables oils and fats were ten representing 76% response rate. Eight of these command the major market shares according a senior manager of one of the respondents. Vegetable oils and fats are products with key potential: processed crude and refined edible oil products, special preference being given to products made from locally grown raw materials.

4.2 General Information

Table 4.2 Ownership of firms

Type of ownership	Number	Percentages %
Subsidiary of multinational	1	6
Partnership	1	6
Joint- Venture	1	6
Local Private company	13	76
Family Venture Business	1	6
Total	**17**	**100**

Source: Research Data

Table 4.2 above shows that of the 17 respondents majority of them were local privately owned companies (76%). The other four companies consisted of a subsidiary of a multinational corporation, a partnership, a joint venture and a family business. These constituted 24% of all the respondents. However, of the 17 firms that responded, six of them representing 35% have since changed their businesses from manufacturing vegetables/animal oils and fats to either textile storage or animal feed manufacturers. One company has since been absorbed by another one within the last few years. Thus, only ten firms representing 59% of all the respondents were analysed and their results reported.

4.21 Incorporation of the firms

Table 4.21 Where Organization originally incorporated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Kenya	9	90.0	90.0	90.0
	Abroad	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Table 4.21 shows that 90% of the companies, which responded, were incorporated in Kenya. They manufactured fats and oils both for local consumption as well as for export.

Only 10% of companies were registered abroad and have been in operation in Kenya for over 20 years. The locally incorporated firms have been in operation for either 1 to 5 years, 30% ; 6 to 10 or 11 to 20 years.

Number of Management Employees

Table 4.22 Number of Management employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 to 300	10	100.0	100.0	100.0

Source: Research Data

From table 4.22 it is notable that all the companies studied have a management team ranging from 1 to 300 employees. Most of them were in the lower management level while the managing director and a few other senior managers make technological investment decisions.

Number of Non-management employees

Table 4.23 Number of Non-Management employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 to 300	6	60.0	66.7	66.7
	301 to 600	2	20.0	22.2	88.9
	Over 900	1	10.0	11.1	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.23 shows that at least, 60% of the firms have 1 to 300 non-management employees while 20% of the firms have 301 to 600 non-management and 10% of the firms have over 900 non-management employees.

Geographical Coverage of the markets

Table 4.24 Geographical market coverage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	In Kenya alone	3	30.0	33.3	33.3
	In East Africa	6	60.0	66.7	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.24 shows that 30% of the firms sell their products within Kenya, 60% sell their fats and oils in East Africa and beyond including COMESA and all over the world.

Trend of sales turnover

Table 4.25 Sales Turnover in 2000 to 2002 **KES 'Million**

	2002		2001		2000	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Below 100M	2	20	2	20	2	20
101 to 500M	3	30	2	20	1	10
500M and Above	4	40	4	40	5	50
Non-response	1	10	2	20	2	20
Total	**10**	**100**	**10**	**100**	**10**	**100**

Source: Research Data

Table 4.25 shows that over the last three years from 2000, 20% of the companies had their turnover ranging between KES 1 and 100 Million. In year 2000, 10% of the firms studied had a turnover of between KES 101 and 500 Million. This increased to 20% in 2001 and to 30% in 2002. However, there was a decline in the companies' with a turnover of KES 501 Million and above from 50% in 2000 to 40% in both year 2001 and 2002.

Firms' Asset Bases

Table 4.26 Firms' total assets ***KES 'Million***

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Below 100M*	*1*	*10.0*	*11.1*	*11.1*
	101 to 500M	*4*	*40.0*	*44.4*	*55.6*
	500M to 1B	*3*	*30.0*	*33.3*	*88.9*
	Over 1B	*1*	*10.0*	*11.1*	*100.0*
	Total	*9*	*90.0*	*100.0*	
Missing	*System*	*1*	*10.0*		
Total		*10*	*100.0*		

Source: Research Data

Table 4.26 shows that total assets of the firms vary. Of those that with asset base of below KES 100million, they represent 10%. Another 40% of the firms have assets of between KES 101 and 500 Million. Some 30% of the companies have asset base of between KES 501 Million and KES 1Billion. At least 10% of the firms have assets valued at over KES 1 Billion.

Table 4.27 Annual Capital Expenditure in 2000 to 2002 KES 'Million

	2002		2001		2000	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Below 100M	4	40	4	40	4	40
101 to 500M	1	10	2	20	3	30
500M and Above	4	40	3	30	2	20
Non-response	1	10	1	10	1	10
Total	**10**	**100**	**10**	**100**	**10**	**100**

Source: Research Data

Table 4.27 shows that capital expenditure on state of the art machinery for manufacturing of edible oils has steadily rose from 20% to 40% in 2000 to 2002 for the category of KES 500 Million and over.

The capital expenditure on the category of KES 1M to 100 Million investments remained constant at 20% from year 2000 to 2002.

Investments in the category of KES 101M to 500M has declined from 30% to 10% from year 2000 to 2002. The 20% could be attributed to shift from this category to that of KES 500M and above.

Table 4.28 Firms' Profitability in 2000 to 2002 **KES 'Million**

	2002		2001		2000	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Below 100M	7	70	6	60	6	60
101 to 500M	1	10	1	10	1	10
500M and Above	1	10	1	10	1	10
Non-response	1	10	2	20	2	20
Total	**10**	**100**	**10**	**100**	**10**	**100**

Source: Research Data

Table 4.28 shows that most firms' profitability mainly lies in the range of KES 1M to 100 Million with 60% of them in 2000 and 2001, while 70% of them in 2002. Firms with profitability of over KES 500 Million consisted only 10% of all the firms studied for all the three years.

Table 4.29 Quantity of fats and oils manufactured in 2000 to 2002 **MT**

	2002		2001		2000	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Below 10MT			1	10		
11 to 50MT	2	20	1	10	2	20
51MT and above	8	80	8	80	8	80
Total	10	100	10	100	10	100

Source: Research Data

Table 4.29 shows that the quantity of edible oils and fats produced by 80% of the firms from 2000 to 2002 was above 51 Metric Tons in each of the years. Only 20% of the firms produced between 1 to 50 Metric Tons for each of the years 2000 to 2002.

4.3 Technology and competitive advantage

This subsection of the analysis deals with section B of the questionnaire. Section B was aimed at achieving the two objectives being studied.

Manufacture of vegetable oils and fats

The largest firms were built for refining imported crude palm oil into a wide range of edible oil products for the Kenyan and Eastern Africa region. About 225,000 metric tons worth about KES 7.5 Billion is being imported into the country for this purpose. The medium enterprises have the capability of processing oilseeds and are taking advantage of the growing raw material base in the country such as maize germ, sunflower, sim sim, safflower and rapeseed. Some of the medium firms produce semi-finished oil products, which are exported to the countries of the region while the seed cakes are converted to animal feeds whose demand is presently very significant. Available for small-scale firms is a manual oil pressing technology (requiring a total investment of approximately KES 30,000) which is now widespread especially where sunflower is grown. Most of the edible oils manufacturers produce more vegetable oils and fats because of the consumer demand.

Organisation Mission Statement

Table 4.31 Clearly Articulated Organization mission statement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	80.0	80.0	80.0
	No	1	10.0	10.0	90.0
	3	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Table 4.31 shows that 80% of the respondents had an articulated mission statement while 10% of respondents did not have a mission statement.

Strategic Company Plan

Table 4.32 Clearly articulated strategic company Plan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	80.0	80.0	80.0
	No	1	10.0	10.0	90.0
	3	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Table 4.32 shows that 80% of the respondents had both an articulated mission statement and a clearly articulated strategic company plan whereas 20% of the respondents did not have both the mission statement and the strategic company plan.

Table 4.33 Existence of a strategic company planning process

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highly formalized	5	50.0	50.0	50.0
	Somewhat formalized	3	30.0	30.0	80.0
	Vaguely structured	1	10.0	10.0	90.0
	No process, no plans	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Table 4.33 shows that there existed a highly formalised strategic company planning process among 50% of the respondents while 30% of the respondents had somewhat formalised strategic company planning process. The remaining 20% had either vaguely structured or no plan and process at all.

Table 4.34 Developers of business strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Top management	6	60.0	60.0	60.0
	Top management and Other employees	3	30.0	30.0	90.0
	Others	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Table 4.34 shows that 60% of the respondents have their business strategy developed by their top management only while 30% of the respondents had both their top management and other employees developing their business strategy. The remaining 10% used other methods including using consultants or adopted their business strategies from their parent companies to develop their business strategies.

Company Plan review

Table 4.35 Frequency of plan review

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Once a year	2	20.0	20.0	20.0
	Quarterly	6	60.0	60.0	80.0
	Monthly	1	10.0	10.0	90.0
	Never	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Most of the respondents reviewed their company plan quarterly. They made up 60% of the respondents. Table 4.35 shows that 20% of them reviewed their company plans once a year while 10% reviewed their company plans once a month while 10% did not review theirs at all.

Table 4.36 Communication of Company Plan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Clearly inadequate detail	5	50.0	50.0	50.0
	Somewhat clearly	4	40.0	40.0	90.0
	Not at all	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Table 4.36 shows that 50% of the respondents communicate their company plan throughout the organisation clearly in adequate detail. Another 40% of the respondents communicated their company plan somewhat clearly, while 10% of the respondents did not communicate it all.

Table 4.37 Understanding of company Vision

			Understanding Company's Strategic Vision				Total
			Very Well	Well	Somewhat Well	Don't Understand	
Groups at Company	Senior Management	Count	8	0	0	0	8
		Expected Count	3.9	3.1	.8	.2	8.0
		% within Groups at Company	100.0%	.0%	.0%	.0%	100.0%
		% within Understanding Company's Strategic Vision	42.1%	.0%	.0%	.0%	20.5%
		% of Total	20.5%	.0%	.0%	.0%	20.5%
	Middle Management	Count	4	3	0	0	7
		Expected Count	3.4	2.7	.7	.2	7.0
		% within Groups at Company	57.1%	42.9%	.0%	.0%	100.0%
		% within Understanding Company's Strategic Vision	21.1%	20.0%	.0%	.0%	17.9%
		% of Total	10.3%	7.7%	.0%	.0%	17.9%
	Line Management	Count	3	4	2	0	9
		Expected Count	4.4	3.5	.9	.2	9.0
		% within Groups at Company	33.3%	44.4%	22.2%	.0%	100.0%
		% within Understanding Company's Strategic Vision	15.8%	26.7%	50.0%	.0%	23.1%
		% of Total	7.7%	10.3%	5.1%	.0%	23.1%
	The rest of Staff	Count	0	6	1	1	8
		Expected Count	3.9	3.1	.8	.2	8.0
		% within Groups at Company	.0%	75.0%	12.5%	12.5%	100.0%
		% within Understanding Company's Strategic Vision	.0%	40.0%	25.0%	100.0%	20.5%
		% of Total	.0%	15.4%	2.6%	2.6%	20.5%
	Technology Professionals	Count	4	2	1	0	7
		Expected Count	3.4	2.7	.7	.2	7.0
		% within Groups at Company	57.1%	28.6%	14.3%	.0%	100.0%
		% within Understanding Company's Strategic Vision	21.1%	13.3%	25.0%	.0%	17.9%
		% of Total	10.3%	5.1%	2.6%	.0%	17.9%
Total		Count	19	15	4	1	39
		Expected Count	19.0	15.0	4.0	1.0	39.0
		% within Groups at Company	48.7%	38.5%	10.3%	2.6%	100.0%
		% within Understanding Company's Strategic Vision	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	48.7%	38.5%	10.3%	2.6%	100.0%

Source: Research Data

Table 4.37 shows that most of the top (senior) managers 80% of the respondents understood their companies' strategic vision very well while 40% of the respondents' middle level managers understood it very well while 30% of the respondents' line managers understood it very well. At least 40% of the respondents agreed that technology professionals understand their company's strategic vision very well.

Firm performance

Table 4.38 Firms' Performance measurement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Profits	2	20.0	20.0	20.0
	Revenue/sales	6	60.0	60.0	80.0
	Growth	1	10.0	10.0	90.0
	Others	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Table 4.38 shows that most firms (60% of the respondents) measure their performance using revenue or sales. The rest measure their performance using profits (20%), growth (10%) and 10% market share. 70% of the respondents rated their performance as moderate while 20% of the respondents rated their performance high and the remaining 10% could not estimate their performances.

4.4 Types of technology used in manufacturing of oils and fats

Table 4.41 Percentage of usage of various technologies

			Types of Technology						Total
			Information Systems	Product	Process	Bio-Technology	Others	6	
Best describes	Yes	Count	5	7	7	1	3	0	23
		Expected Count	3.8	3.8	3.8	3.8	3.8	3.8	23.0
		% within Best describes	21.7%	30.4%	30.4%	4.3%	13.0%	.0%	100.0%
		% within Types of Technology	50.0%	70.0%	70.0%	10.0%	30.0%	.0%	38.3%
		% of Total	8.3%	11.7%	11.7%	1.7%	5.0%	.0%	38.3%
	No	Count	5	3	3	9	7	10	37
		Expected Count	6.2	6.2	6.2	6.2	6.2	6.2	37.0
		% within Best describes	13.5%	8.1%	8.1%	24.3%	18.9%	27.0%	100.0%
		% within Types of Technology	50.0%	30.0%	30.0%	90.0%	70.0%	100.0%	61.7%
		% of Total	8.3%	5.0%	5.0%	15.0%	11.7%	16.7%	61.7%
Total		Count	10	10	10	10	10	10	60
		Expected Count	10.0	10.0	10.0	10.0	10.0	10.0	60.0
		% within Best describes	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	100.0%
		% within Types of Technology	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	100.0%

Source: Research data

Table 4.41 shows that process and product technology are the frequently and commonly used types of technology in the manufacturing of edible oils and fats. At least 70% of the respondents indicated that they used both process and product technologies. Some 50% of the respondents indicated that they used information technology alongside product and process technologies. Computer –Aided Design Technology was used by 30% of the respondents.

Table 4.42 Product technology rating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not important	1	10.0	11.1	11.1
	Important	2	20.0	22.2	33.3
	Highly important	2	20.0	22.2	55.6
	Extremely important	4	40.0	44.4	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.42 shows that on the rating of the importance of product technology, 40% of the respondents rated it as extremely important while 20% rated it as either highly important or just important for the competitive advantage of their firms. Only 10% did not see it as important.

Table 4.43 Process technology rating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly important	1	10.0	11.1	11.1
	Highly important	1	10.0	11.1	22.2
	Extremely important	7	70.0	77.8	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.43 shows that process technology was rated extremely important by 70% of the respondents while 20% rated it as either highly important or slightly important.

Table 4.44 Pilot-plant technology rating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not important	2	20.0	22.2	22.2
	Slightly important	1	10.0	11.1	33.3
	Important	4	40.0	44.4	77.8
	Highly important	2	20.0	22.2	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.44 shows that Pilot plant technology was rated as highly important by 20% of the respondents while 40% of the respondents indicated that it was important while 20% of the respondents did not see its importance to competitive advantage to their firms. Only 10% of the respondents agreed that it was only slightly important for their firm's competitiveness.

Table 4.45 software development tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not important	2	20.0	22.2	22.2
	Slightly important	2	20.0	22.2	44.4
	Important	2	20.0	22.2	66.7
	Highly important	3	30.0	33.3	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.45 shows that software development tools were rated as extremely important by 30% of the respondents and 20% each for important, slightly important and not important ratings.

Table 4.45 Biotechnology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not important	4	40.0	44.4	44.4
	Important	3	30.0	33.3	77.8
	Highly important	2	20.0	22.2	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.45 shows that bio-technology was rated as highly important by 30% of the respondents while 30% indicated it as important and another 40% simply did not see it as important in any way for competitive advantage.

Table 4.46 computer aided design rating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not important	4	40.0	44.4	44.4
	Slightly important	2	20.0	22.2	66.7
	Important	2	20.0	22.2	88.9
	Extremely important	1	10.0	11.1	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.46 shows Computer- Aided Design technology was rated as extremely important by only 10% of the respondents while 20% of the respondents rated it as important; another 20% rated it as slightly important and 40% indicated it as not important at all in the competitiveness of the firm.

Table 4.47 information systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not important	1	10.0	11.1	11.1
	Slightly important	1	10.0	11.1	22.2
	Important	2	20.0	22.2	44.4
	Highly important	4	40.0	44.4	88.9
	Extremely important	1	10.0	11.1	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Source: Research Data

Table 4.47 shows that Information (systems) technology was rated as extremely important by only 10% of the respondents; highly important by 40%; important by 20%; slightly important by 10% and not important at all by 10% for the competitive advantage of the respondents.

Table 4.48 Existence of technology department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	60.0	60.0	60.0
	No	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Source: Research Data

Table 4.48 shows that there exists a technology department in 60% of respondents' firms and 40% did not have it. There existed a Research and Development manager in only 30% of the respondents' firms while 70% of the respondents did not have a Research and Development manager.

Table 4.49 Developer of technology in Your Company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	In-house	6	60.0	60.0	60.0
	Acquisition of current players	1	10.0	10.0	70.0
	Adopted from parent Company	1	10.0	10.0	80.0
	Others	2	20.0	20.0	100.0
	Total	**10**	**100.0**	**100.0**	

Source: Research Data

Table 4.49 shows that 60% of the respondents used technology developed in-house while 10% acquired their technology from the current market players; another 10% adopted their technologies from their parent companies and the remaining 10% used consultants.

4.5 Distinctive Expertise of the firms

Table 4.51 Capability Rating * Areas of Expertise Cross-tabulation

			Areas of Expertise						Total
			Product R & D	Process R & D	Marketing Capability	Managing International Activities	Innovation & Entrepreneurship	Technological advancement	
ility	Below Average	Count	3	3	1	2	3	1	13
		Expected Count	1.9	1.9	2.4	2.4	2.4	2.1	13.0
		% within Capability Rating	23.1%	23.1%	7.7%	15.4%	23.1%	7.7%	100.0%
		% within Areas of Expertise	37.5%	37.5%	10.0%	20.0%	30.0%	11.1%	23.6%
		% of Total	5.5%	5.5%	1.8%	3.6%	5.5%	1.8%	23.6%
	Fairly below Average	Count	0	0	0	2	0	0	2
		Expected Count	.3	.3	.4	.4	.4	.3	2.0
		% within Capability Rating	.0%	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Areas of Expertise	.0%	.0%	.0%	20.0%	.0%	.0%	3.6%
		% of Total	.0%	.0%	.0%	3.6%	.0%	.0%	3.6%
	Average	Count	3	2	3	1	4	0	13
		Expected Count	1.9	1.9	2.4	2.4	2.4	2.1	13.0
		% within Capability Rating	23.1%	15.4%	23.1%	7.7%	30.8%	.0%	100.0%
		% within Areas of Expertise	37.5%	25.0%	30.0%	10.0%	40.0%	.0%	23.6%
		% of Total	5.5%	3.6%	5.5%	1.8%	7.3%	.0%	23.6%
	Fairly above average	Count	1	1	3	3	1	3	12
		Expected Count	1.7	1.7	2.2	2.2	2.2	2.0	12.0

		% within Capability Rating	8.3%	8.3%	25.0%	25.0%	8.3%	25.0%	100.0%
		% within Areas of Expertise	12.5%	12.5%	30.0%	30.0%	10.0%	33.3%	21.8%
		% of Total	1.8%	1.8%	5.5%	5.5%	1.8%	5.5%	21.8%
	5	Count	1	2	3	2	2	5	15
		Expected Count	2.2	2.2	2.7	2.7	2.7	2.5	15.0
		% within Capability Rating	6.7%	13.3%	20.0%	13.3%	13.3%	33.3%	100.0%
		% within Areas of Expertise	12.5%	25.0%	30.0%	20.0%	20.0%	55.6%	27.3%
		% of Total	1.8%	3.6%	5.5%	3.6%	3.6%	9.1%	27.3%
tal		Count	8	8	10	10	10	9	55
		Expected Count	8.0	8.0	10.0	10.0	10.0	9.0	55.0
		% within Capability Rating	14.5%	14.5%	18.2%	18.2%	18.2%	16.4%	100.0%
		% within Areas of Expertise	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	14.5%	14.5%	18.2%	18.2%	18.2%	16.4%	100.0%

Source: Research Data

Table 4.51 shows that 10% of the respondents viewed product Research and Development expertise as above average; 10% saw it as fairly above average; 30% indicated it as average and another 30% as below average. For process Research and development, 20% of the respondents rated it as above average; 10% as above average; 20% as average and 30% as below average while 20% did not respond to this.

On marketing capability, 30% of the respondents indicated that theirs was above average; 30% reported that they viewed it as fairly above average; 30% as average and 10% as below average. On managing international activities, 20% reported it as above average; 30% as fairly above average; 10% respondents reported it as average; 20% as fairly below average and another 20% as below average.

In innovation and entrepreneurship, 10% respondents reported that theirs was above average; 10% fairly above average; 40% average and 30% below average.

In technological advancement, 50% rated it as above average; 30% as fairly above average and 10% as below average.

New Product development

At least 80% of the respondents have developed a new product recently, 40% of them in the last one year and the other 40% between 2 to 3 years ago. The remaining 10% developed a new product between 4 and 5 years.

Intensity of competition

Table 4.52 Competitive Advantage Statements

			Answer					Total
			I strongly agree	I agree	I don't agree	I disagree	Strongly disagree	
Statements	Competition in this country is intense	Count	9	1	0	0	0	10
		Expected Count	4.6	2.1	1.6	.4	1.3	10.0
		% within Statements	90.0%	10.0%	.0%	.0%	.0%	100.0%
		% within Answer	23.7%	5.9%	.0%	.0%	.0%	12.2%
		% of Total	11.0%	1.2%	.0%	.0%	.0%	12.2%
	International competition is intense	Count	4	3	3	0	0	10
		Expected Count	4.6	2.1	1.6	.4	1.3	10.0
		% within Statements	40.0%	30.0%	30.0%	.0%	.0%	100.0%
		% within Answer	10.5%	17.6%	23.1%	.0%	.0%	12.2%
		% of Total	4.9%	3.7%	3.7%	.0%	.0%	12.2%
	New Corporate investments in R & D or manufacturing in the co	Count	2	3	1	1	2	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	22.2%	33.3%	11.1%	11.1%	22.2%	100.0%
		% within Answer	5.3%	17.6%	7.7%	33.3%	18.2%	11.0%
		% of Total	2.4%	3.7%	1.2%	1.2%	2.4%	11.0%
	Top Management has experience with innovation	Count	2	2	3	1	1	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	22.2%	22.2%	33.3%	11.1%	11.1%	100.0%
		% within Answer	5.3%	11.8%	23.1%	33.3%	9.1%	11.0%
		% of Total	2.4%	2.4%	3.7%	1.2%	1.2%	11.0%
	Decision to change machine setup is made at high level of Management	Count	6	2	0	0	2	10
		Expected Count	4.6	2.1	1.6	.4	1.3	10.0
		% within Statements	60.0%	20.0%	.0%	.0%	20.0%	100.0%
		% within Answer	15.8%	11.8%	.0%	.0%	18.2%	12.2%
		% of Total	7.3%	2.4%	.0%	.0%	2.4%	12.2%

	Decision to change to a new manufacturing process is made at top level of Mgt	Count	6	0	1	0	0	7
		Expected Count	3.2	1.5	1.1	.3	.9	7.0
		% within Statements	85.7%	.0%	14.3%	.0%	.0%	100.0%
		% within Answer	15.8%	.0%	7.7%	.0%	.0%	8.5%
		% of Total	7.3%	.0%	1.2%	.0%	.0%	8.5%
	New product introductions occur in all major markets simultaneous	Count	3	3	1	1	1	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	33.3%	33.3%	11.1%	11.1%	11.1%	100.0%
		% within Answer	7.9%	17.6%	7.7%	33.3%	9.1%	11.0%
		% of Total	3.7%	3.7%	1.2%	1.2%	1.2%	11.0%
	Technology has enabled our company to improve product quality	Count	6	2	1	0	0	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	66.7%	22.2%	11.1%	.0%	.0%	100.0%
		% within Answer	15.8%	11.8%	7.7%	.0%	.0%	11.0%
		% of Total	7.3%	2.4%	1.2%	.0%	.0%	11.0%
	Technology has enabled our company to increase our prices	Count	0	1	3	0	5	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	.0%	11.1%	33.3%	.0%	55.6%	100.0%
		% within Answer	.0%	5.9%	23.1%	.0%	45.5%	11.0%
		% of Total	.0%	1.2%	3.7%	.0%	6.1%	11.0%
Total		Count	38	17	13	3	11	82
		Expected Count	38.0	17.0	13.0	3.0	11.0	82.0
		% within Statements	46.3%	20.7%	15.9%	3.7%	13.4%	100.0%
		% within Answer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	46.3%	20.7%	15.9%	3.7%	13.4%	100.0%

Source: Research Data

Table 4.52 shows that 90% of the respondents strongly agree that competition in Kenya are very intense. Only 10% of the respondents agreed that competition in the country is intense. Some 40% and 30% of the respondents strongly agreed and agreed respectively that international competition is also intense. Only 30% of the respondents did not agree that international competition is intense. This was attributed to the fact that they only manufacture fats and oils for local consumption.

4.6 The relationship between technology and competitive advantage

Technology choices in various domains allow a firm to secure competitive advantage in three ways: by creating fundamentally new businesses and competitive domains; by altering the rules of rivalry in the existing competitive domains and by supporting existing businesses.

New investments in Research and development

Firms often pursue basic and applied research which enables them to discover opportunities for totally new businesses.

Table 4.52 shows that 20% of the respondents strongly agree that new corporate investments in R & D or manufacturing in the company is high. Some 30% of the respondents agree that the investment is high. Only 10% did not agree that investments were high in R & D while another 10% disagreed that there was any investments in R & D in the company. At least 20% of the respondents strongly disagreed that there was any new corporate investments in R & D.

The impact of technology on competition has led many new businesses to emerge from technological capabilities that were embodied as products and brought to the market by pioneering firms through research.

Table 4.52 shows that 20% of the respondents strongly agreed that top management of their organisations had experience with innovation. Another 20% of the respondents agreed that their top management had experience in innovation; 30% did not agree; 10% disagreed and 10% strongly disagreed that their top management had experience in innovation.

Further, table 4.52 shows that 60% of the respondents strongly agree that the decision to change machine set up and switch to a new manufacturing process was made at the top-level management. Only 20% of the respondents strongly disagreed that the decision to change machine set up was made at the top level of management.

Table 4.52 shows that a total of 60% of the respondents agree (30%) and strongly agree (30%) that new product introductions in various markets once manufactured occurred simultaneously. The other 30%; disagreed (10%), did not agree (10%) or strongly disagreed (10%).

Table 4.52 shows that a total of 80% of the respondents agreed that the use of technology had enabled their companies their products' quality thereby satisfying their customers. Only 10% of the respondents disagreed and 10% did not respond.

The table also indicates that only 10% of the respondents agreed that the use of technology in the manufacturing of their vegetables/animal oils and fats had enabled their companies to increase their prices. A total of 80% of the respondents strongly disagreed (50%) and disagreed (30%). This is entirely in agreement with the value addition of the firms to their customers.

Table 4.52 further shows that 60% of the respondents strongly agreed that the use of technology had enabled their companies to increase their market share. Another 10% also agreed that they had increased their market share with the use of technology. Only 20% either strongly disagreed (10%) or did not agree (10%). There was a 10% non-response.

Firms have used technology to alter the rules of rivalry in the existing competitive domains. In these cases, the underlying customer functionality is not new to the market place, but through the deployment of technological capabilities in the manufactured edible oils added to the value chain configurations, some leading firms have acquired market positions to the detriment of their competitors.

Table 4.52 shows that 60% of the respondents strongly and another 20% agreed that the use of technology had enabled their company to improve their processes significantly. Another 10% did not agree that the use of technology had enabled their company to improve their processes. Only 10% of the respondents did not respond.

Product and process innovations of firms especially in the edible oil manufacturing industry have propelled those that have opted for them. Product innovations have focused on enhancement of product features or improvement of customer acceptance. Process innovations have focused on improvements in manufacturing processes or on using different or new raw materials. Both were oriented towards improving the firms' competitive position within the existing competitive domains.

4.6 Technological factors affecting competitive advantage

Table 4.7 shows the findings on importance of technological factors on competitive advantage of the animal/vegetables oils and fats. A total of 20 factors were surveyed and the managing directors or their delegates were asked to tick the most appropriate option on a scale of one to five, one being of low importance, two being slightly-low, three being medium, four being slightly high and five being very high.

The outcomes of the responses were presented in a table showing the above options and an additional column for non-response. Out of the findings, a mode was used to select the most common response(s) and listed alongside every factor of technology.

Table 4.7 Responses on importance of factors of technology to competitive advantage of firms

Factor	Low	Slightly Low	Medium	Slightly High	High	Non-response	Mode
Investment in Research & Development as a percentage of profit(1=low, 5= high)	50	10	20		10	10	Low
Investment in Research as a percentage of profit(1=low, 5= high)	20	10	20	20	20	10	Medium-high
Investment in Development as a percentage of profit(1=low, 5= high)	10	30	30		20	10	Low-medium
Frequency of new products(1=low, 5= high)	30	10	30		20	10	Low-medium
Frequency of new technologies(1=low, 5= high)		30	30	30		10	Medium
Competitive intensity(1=low, 5= intensity)			10	50	20	20	Slightly high
Technology as competitive tool (1=unimportant, 5=key)			10	50	30	10	Slightly high
Technological turbulence (1=low, 5=high)	20	20		10	20	30	Low
Aggressiveness of firm's strategy (1=low, 5=high)			20	30	30	20	High
Research leadership (1=imitator, 3=follower, 5=innovator)	10		20	30	30	10	High
Product leadership (1=imitator, 3=follower, 5=innovator)	20		30	30	10	10	Medium-high
Process leadership (1=imitator, 3=follower, 5=innovator)	10	10	30	30	10	10	Medium-high
Length of product life cycle (1=long, 5=short)		10	50		20	20	Medium
Technological product differentiation (1=none, 5=large)	20	10	10	30	10	20	Medium-high
Technological advance in successive products (1=small, 5=large)	10		20	40	10	20	Slightly high
Number of competing technologies (1=one, 5=many)	10	10	20	30	10	20	Slightly high
Forced product obsolescence (1=none, 5=frequent)	20	30	10		10	30	Low
Technological response to government regulations(1=unimportant, 5=key)	10		40	20	10	20	Medium
Technological response to consumer pressures(1=unimportant, 5=key)	10		10	30	30	20	High

Source: Research data

From table 4.7 above, it is discernable that investment in Research and Development as a percentage of profit is low for most of the manufacturers of vegetable/animal oils and fats (50% of the firms rated low). This may be attributable to cost involved in research and development.

However, between research and development, more firms seem to do more research (medium-high) and less investment in development (low-medium) of the findings.

On the frequency of new products, most of the firms seemed to contradict themselves as majority of them (70% in the low-medium segment) as compared to 80% (Appendix) of them who agreed that they developed new products recently.

Most firms (90% in the slightly low-medium-slightly high) indicated that they frequently used new technologies in the manufacture of fats and oils due to changing customer needs and tastes.

Firms in the vegetables/animal oils and fats acknowledged the existence of intense competition. Most of them (50% fell in the slightly high category). This was also confirmed by their responses to the importance of technology as a competitive tool where 50% of the firms rated it as slightly high.

The importance of technological turbulence as a factor of competitive advantage seemed to be classified as both ends of the same coin by the firms. 40% of the respondents placed it under the low slightly-low segment while another 30% thought that it was in the slightly-high and high segment.

The results indicated that most firms' strategy is that of aggressiveness (60% in the slightly-high, high segment). This was propped up by the 60% response as slightly high, high to research leadership. It appeared that the firms acknowledged that research leadership (innovation rather than being a follower) is extremely important for the creation of competitive advantage to the manufacturing firms.

On the importance of product leadership to the competitiveness of the firms, 60% respondents rated it as medium and slightly high. This seemed to go hand in hand with the importance of process leadership which was also rated the same by 60% of the manufacturers.

50% of the respondents indicated that the length of their product life cycle was medium; 20% others indicated that it was long and another 20% said that it was short. The 20% whose product life cycle is short have continuously developed new product. This reinforces the proportion of firms that developed new products frequently (20%).

At least 50% of the firms rated technological product differentiation as between medium and high in terms of importance to competitive advantage to them. This was further reinforced by their answer to technological advance in successive products where 70% of the firms rated it as medium (20%), slightly-high (40%) and high (10%). This meant that a large number of products were developed by the firms in one year and other subsequent years.

The importance of the number of competing technologies to competitive advantage of the vegetables/animal oils and fats manufacturing firms was reported as between medium and slightly high. There were many types of technologies that compete and include product technology and bio-technology.

The respondents indicated that forced product obsolescence was low meaning that few or no products were made obsolete in the vegetable/animal oils and fats processing. At least 60% of the respondents fell in the low-medium segment. It was established that some firms were selling to their competitors the right to manufacture what they themselves thought it was declining in the market. The trend would then be changed when the buyer of the rights re-introduces the old product. For example, one company sold Kimbo to its competitor. Another manufacturer of Elianto sold the rights to another manufacturer.

Both the technological response to government regulations and to consumer pressure were rated almost the same by at least 70% of the respondents. They rated it as medium, slightly high and high. It means that they saw these two factors as being key to every firm's competitiveness.

The pearson's correlation coefficient, two tailed test $P< 0.02$ found a positive relationship between the process and product technology used and firm investments. It can be concluded that competitive advantage of the firms is a function of technology adopted by the firm. Investments in process technology leads to improved efficiency and reduced wastages.

CHAPTER FIVE

SUMMARY, DISCUSSIONS AND CONCLUSIONS

5.1 Summary of the findings and discussion

The study identified the types of core technologies used in the manufacture of vegetables and animal oils and fats. It also examined the relationship between technology and competitive advantage among the vegetable and animal oils and fats manufacturers in Kenya. The study reported that:

i. The commonly used types of core technologies used among Kenyan firms in the vegetables and animal oils and fats manufacturing industry are process technology (70%) of the respondents; product technology (70%); information technology was moderately used by the firms with 50% response;

ii. The link between technology and competitive advantage is positive and dynamic and thus undergo significant changes over time;

iii. Technological factors influencing competitive advantage are key in the choices of business/corporate strategies of the manufacturing firms.

For at least 50% of the leading companies to have responded affirmatively to the use of product, process and information technology means that these types of technology are vital for their competitiveness. The recent, rapid technological change in information systems is having a profound impact on competition and competitive advantages because of the pervasive role of information in the value chain.

5.2 Conclusion

The study reveals that the manufacturers of vegetable and animal oils and fats inevitably use technology to process their products. In order for them to be more competitive than their competitors, they have invested in state of the art process and product technologies that has enabled some of them focus on their target customers; differentiate their products and cut down their costs. This has ensured that their customers are satisfied beyond their expectations and have guaranteed them market growth, share and revenue.

The leading manufacturer in the industry has invested heavily in technology thereby improving its speed and quality significantly and managed to buy out some players in the industry. It has also managed to take over the production of a leading brand of edible vegetable in Kenya from a former monopoly.

Technology and firm competitiveness is about realigning processes. It is about creating value and reducing wastage. It is about having a re-look at the way firms work and strive to work smarter, not harder. It has so much to do with taking advantage of evolving technology to make work easier and faster. It about sustaining a culture of continuous improvement. It is about making technology work for the firms, not them working for technology. At the end of it all, rather than being stretched to the limit, the manufacturers shall find themselves more relaxed, proud enthusiastic and productive, on top of things, and will improve processes again and again, embracing and leveraging change for their benefit rather than dreading it.

5.3 Limitations of the study

The study focused more specifically on technology and competitive advantage. Other environmental factors such as economic might have seriously affected the operations of the firms. It only focused on the vegetables, animal oils and fats manufacturers, and not all the manufacturers of food products.

Some firms have wound up their operations while others never agreed to participate in the study. The findings are based on responses by only ten firms making it a small sample. The content of the study would have been better if these firms had participated. This limited the analysis to descriptive and judgemental methods and not scientific analysis.

Resource constraint was also another limitation. Time allocated for the study was limited. No past study known to the researcher, has ever been done locally on types of technology and its link with competitive advantage of manufacturers of food products. The researcher therefore lacked a base and had to rely on studies done in other countries.

5.4.1 Problems encountered

The researcher encountered the problem of managing directors or general managers' unwillingness to participate in the survey. Some companies have even put in place a policy not to complete questionnaires. They complain that there are too many questionnaires from all institutions of higher learning and if they were to complete all of them, then they needed to hire full time employees to do it, which is not cost effective. Some of the managers out rightly rejected the questionnaire even before looking at them stating that theirs was a private business. The University of Nairobi will need to review the situation with the industry in future and come up with a lasting solution to this challenge.

Some companies although listed in the manufacturers' directory have since wound up their operations making it difficult to meet and interview their managers. The Kenya Association of Manufacturers needs to review their members regularly and remove from their register those that are no longer active.

5.4.2 Recommendations for further research and practitioners

More research is needed to establish:

1. The relationship between technology and competitive advantage in other sectors or industries of the economy such as the pharmaceutical industry;
2. The contribution of external environment to the relationship between technology and competitive advantage and
3. The link and role of Information Technology to firm competitive advantage

From the analysis, 50% of the respondents acknowledged that Information Technology plays a key role the competitive advantage of the firms. In view of the current trend in business where information is power, it is worth noting that the timely access to accurate, relevant and sufficient information is vital in the firms' competitiveness. This means therefore that if firms need to be ahead of the game they need to develop appropriate information technology strategy. In an information-based market place, Information Technology will be used to assess the effectiveness of new products in real time.

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APPENDIX 1

Cover letter

Nicholas K. Letting,
University of Nairobi,
Faculty of Commerce,
Department of Business Administration,
P.O. Box 30197,
NAIROBI
Mobile No. 0722-284133

Dear Sir/Madam,

RE: LETTER OF INTRODUCTION

I am a postgraduate student undertaking a degree of Master of Business Administration, Faculty of Commerce, University of Nairobi. For my final research project, I am conducting a research on: *"The Relationship between Technology and Competitive Advantage: The case of vegetables and animal oils and fats manufacturers in Kenya"* as a partial fulfilment of the requirements for the award of the degree.

Your firm has been selected to form part of the study. I kindly request you to fill the attached questionnaire. Any information that you provide will be treated in strict confidence and used only for the purpose for which it is intended i.e. academic. Neither your name nor the name of your organisation is required.

A copy of the research project will be made available to you upon request.

Your co-operation will be greatly appreciated.

Thank you in advance.

Yours sincerely,

NICHOLAS KIBIWOT LETTING'
MBA II STUDENT

DR. MARTIN OGUTU
SUPERVISOR

APPENDIX 2

Data Collection Questionnaire

APPENDIX 11: Data Collection Questionnaire

QUESTIONNAIRE FOR THE RELATIONSHIP BETWEEN TECHNOLOGY AND COMPETITIVE ADVANTAGE: THE CASE OF VEGETABLE AND ANIMAL OILS AND FATS MANUFACTURERS IN KENYA

This questionnaire is compiled by Nicholas K. Letting' for research in the Master of Business Administration (MBA) degree programme, Faculty of Commerce, University of Nairobi. Please complete it as truthfully as possible. It will take about 30 minutes only to complete. Your responses will be treated in strict confidence and used only for academic purposes.

SECTION A: GENERAL INFORMATION

Please tick (√) where appropriate

A1. Name of your organisation (Optional)..... Location .....

A2 Your organization was originally incorporated in? □ Kenya □ Abroad

A3 Nature of business – Industry/Sector.....

A4 What products/Services does your company offer?

□Vegetable oils

□Vegetable fats

□Animal oils

□Animal fats

□Both vegetables and animal oils and fats

A4 How many product lines does your company have?

□ 1 □ 2 □ 3 □ 4 □ 5 □ more than 6

A5 How long has your organization operated in Kenya?

□ 0 to 5 years

□ 6 to 10 years

□ 11 to 20 years

□ Over 20 years

A6 Ownership

□ wholly locally owned with public shareholding

□ Subsidiary of multinational with public shareholding

□ Joint-venture

□ Other (Please, specify:.....

A7. Number of Management employees currently.

□ 1 to 300

□ 301 to 600

□ 601 to 900

□ Over 900

A8. Number of Non-Management employees currently.

- □ 1 to 300
- □ 301 to 600
- □ 601 to 900
- □ Over 900

A9. What is the geographical coverage of your operations?

- □ In Kenya alone
- □ East Africa
- □ COMESA
- □ Africa
- □ All over the world

A10. What has been your turnover over the last five years? Kshs.

2002	□ below 100M	□ 101 to 500M	□ 500M and over
2001	□ below 100M	□ 101 to 500M	□ 500M and over
2000	□ below 100M	□ 101 to 500M	□ 500M and over
1999	□ below 100M	□ 101 to 500M	□ 500M and over
1998	□ below 100M	□ 101 to 500M	□ 500M and over

A11 Value of total assets in Kshs

□ below 100M □ 101 to 500M □ 500M to 1B □ over 1B

A12 Value of annual Capital Expenditure on state of the art production machines for the last three years in Kenya Shillings

2002	□ below 100M	□ 101 to 500M	□ 500M and over
2001	□ below 100M	□ 101 to 500M	□ 500M and over
2000	□ below 100M	□ 101 to 500M	□ 500M and over
1999	□ below 100M	□ 101 to 500M	□ 500M and over
1998	□ below 100M	□ 101 to 500M	□ 500M and over

A13. What has been your firm's profit over the last three years? In Kshs

2002	□ below 100M	□ 101 to 500M	□ 500M and over
2001	□ below 100M	□ 101 to 500M	□ 500M and over
2000	□ below 100M	□ 101 to 500M	□ 500M and over
1999	□ below 100M	□ 101 to 500M	□ 500M and over
1998	□ below 100M	□ 101 to 500M	□ 500M and over

A14. What tonnage of fats and oils has your firm produced over the last three years? In Metric Tonnes (MT)

2002	□ below 10MT	□ 11 to 50MT	□ 51 MT and over
2001	□ below 10M	□ 11 to 50MT	□ 51 MT and over
2000	□ below 10M	□ 11 to 50MT	□ 51 MT and over
1999	□ below 10M	□ 11 to 50MT	□ 51 MT and over
1998	□ below 10M	□ 11 to 50MT	□ 51 MT and over

SECTION B: TECHNOLOGY AND COMPETITIVE ADVANTAGE

B1. Does your organization have a clearly articulated mission statement?

□ Yes □ No

If yes, please state it.

B2 Does your organization have a clearly articulated strategic company plan?

□ Yes □ No

B3 What kind of strategic company planning process does your company have/follow?

□Highly formalized

□Somewhat formalized

□Vaguely structured

□ No process may create one

□ No process, no plans

B4 Who developed your business strategy?

□ Top management

□ Top management and other employees

□ Consultants

□ Adopted from parent company

□Others (please, specify.....)

B5 How often is your company plan reviewed?

□Once a year

□Twice a year

□Quarterly

□Monthly

□Never

B6 How well is the company plan communicated throughout your company?

□Clearly in adequate detail

□Somewhat clearly

□Not at all

B7 How well do the following groups at your company understand the company's strategic vision?

Tick appropriately in the table below.

	Very well	Well	Somewhat Well	Don't Understand
Senior Management				
Middle Management				
Line Management				
The rest of the staff				
Technology Professionals				

B8 What challenges did you encounter while implementing your company plan?

B9 How did you overcome the above challenges?

B10 How is performance measured in your organisation?

□Profits

□Revenue or sales

□Growth

□ Survival

□ Market share

□Others (please, specify.....)

B11 Rate your organisation according to the relevant performance measure identified in No. B10

By ticking one of the following

□ High

□ Moderate

□ Low

□Cannot estimate

B12 Which of the following types of technology best describes those used in your company? More than one answer is allowed.

□ Information (Systems) Technology

□ Product Technology

□ Process Technology

□ Bio-Technology

□ Computer Aided-design Technology

□Others (please specify)

B13 How important would your company consider each of the following types of technology to the competitive advantage of your firm?

Please, rate each type of technology on a scale from "1" to "5"

"1" means your company considers that type of technology "not important"

"5" means your company considers that type of technology "extremely important"

	Not Important				Extremely Important
	1	2	3	4	5
Product Technology	□	□	□	□	□
Process Technology	□	□	□	□	□
Pilot Plant Technology	□	□	□	□	□
Software Development Tools	□	□	□	□	□
Bio-Technology	□	□	□	□	□
Computer Aided-design Technology	□	□	□	□	□
Information (Systems) Technology	□	□	□	□	□
Others (please specify)	□	□	□	□	□

B13 Does your company have a Technology Department □ Yes □ No

If no, who provides technology services to your company?

B14 Does your company have Research and Development manager □ Yes □ No

If no, who provides Research and Development services to your company?

B15 Who developed the technology being used in your company?

□ In-house

□ Acquisition of current players

□ Alliances with other players in the industry

□ Adopted from parent company

□Others (please, specify.....)

B16 Indicate by circling the correct choice the capability or distinctive expertise of your firm in the following areas.

1- Below average 2-Fairly below average 3-Average 4-Fairly above average 5- Above average

Product R&D	1 2 3 4 5
Process R&D	1 2 3 4 5
Marketing Capability	1 2 3 4 5
Managing International Activities	1 2 3 4 5
Innovation & Entrepreneurship	1 2 3 4 5
Technological advancement	1 2 3 4 5

B17 Has your company developed any new product recently?

□YES □NO

If yes, how recent is it?

□ 0 to 1 Years □ 2 to 3 years □ 4 to 5 years □ 6 to 10 years □ over 11 years

B18 **To what extent do you agree or disagree with the following stabtements? Please, indicate by circling only one answer.**

1 = I strongly agree 2 = I Agree 3 = I don't agree 4 = I disagree

5 = strongly disagree

Competition in this country is intense 1 2 3 4 5

International competition is intense 1 2 3 4 5

New corporate investments in R&D or manufacturing in the company is high 1 2 3 4 5

Top management has experience with innovation 1 2 3 4 5

Decision to change machine set up is made at high level of management 1 2 3 4 5

Decision to switch to a new manufacturing process is made at the top level of management 1 2 3 4 5

New product introductions occur in all major markets simultaneously 1 2 3 4 5

The use of technology has enabled our company to improve product quality 1 2 3 4 5

The use of technology has enabled our company to increase our prices 1 2 3 4 5

The use of technology has enabled our company to increase our market share 1 2 3 4 5

The use of technology has enabled our company to improve our processes 1 2 3 4 5

B19 **How important would you consider each of the following factors of technology to the competitive advantage of your firm? Please, indicate by ticking (√) only one answer.**

Please rate each factor on a scale of "1" to "5"

"1" means you consider the factor as low

"5" means you consider the factor as high

The numbers between "1" and "5" represent degrees between "low" and "high"

	1	2	3	4	5
Investment in Research &Development as a percentage of profit (1=low, 5= high)					
Investment in Research as a percentage of profit(1=low, 5= high)					
Investment in Development as a percentage of profit(1=low, 5= high)					
Frequency of new products(1=low, 5= high)					
Frequency of new technologies(1=low, 5= high)					
Competitive intensity(1=low, 5= intensity)					
Technology as competitive tool (1=unimportant, 5=key)					
Technological turbulence (1=low, 5=high)					
Aggressiveness of firm's strategy (1=low, 5=high)					
Research leadership (1=imitator, 3=follower, 5=innovator)					
Product leadership (1=imitator, 3=follower, 5=innovator)					
Process leadership (1=imitator, 3=follower, 5=innovator)					
Length of product life cycle (1=long, 5=short)					
Technological product differentiation (1=none, 5=large)					
Technological advance in successive products (1=small, 5=large)					
Number of competing technologies (1=one, 5=many)					
Forced product obsolescence (1=none, 5=frequent)					
Technological response to government regulations(1=unimportant, 5=key)					
Technological response to consumer pressures(1=unimportant, 5=key)					

Source: Adapted from Ansoff, H.I & McDonell, E.J (1990), **Implanting Strategic Management** Pp. 177, Prentice Hall, 2nd Edition

THANK YOU FOR YOUR RESPONSE

APPENDIX 111

List of Vegetables and Animal Oils and Fats Manufacturers in Kenya

APPENDIX 111

List of Vegetables and Animal Oils and Fats Manufacturers in Kenya

1. Aberdare Oil Millers Ltd
2. Allied Industries Ltd
3. Arkay Industries Ltd
4. Babra Industries Ltd
5. Bidco Oil Refineries Ltd
6. Bubanks Ltd
7. Coastal Industries
8. CPC Kenya Ltd
9. Eastern Industrial Works
10. Eldoret Oil Industries Ltd
11. Elianto Kenya Ltd
12. Kapa Oil Refineries Ltd
13. Kenya Nut Company Ltd
14. Kibos Industries Ltd
15. Kisumuwalla Oil Industries Ltd
16. Kisauni Walla Oil Industries Ltd
17. Mafuta Refineries Ltd
18. Malindi Industries Ltd
19. Menengai Oil Refineries Ltd
20. Nakuru Oil Mills (1974) Ltd
21. Naurshad Trading Company Ltd
22. Oil Crop Development Ltd
23. Oriental Perfumed Works Ltd
24. Palmac Oil Refineries Ltd
25. Premier Oil Mills Ltd
26. Pwani Oil Products
27. Refinoil Manufacturing Company Ltd
28. Rift Valley Products Ltd
29. Sansora Oil Mills Ltd
30. Sava Industries Ltd
31. Soy-Afric Ltd
32. Unilever Kenya Ltd
33. Vegetable Oil Industries Ltd

Source: The Manufacturers' Directory 2002 Edition of Kenya Association of Manufacturers (Page 67).

Appendix 4
Factor Analysis

Correlation Matrix

		Articulated Mission Statement	Articulated Strategic Company Plan	Existence of a strategic company planning process	developer of business strategy	Frequency of plan review	Communications	Performance measure	Performance rating	existence of technology department	existence of Rand D manager	developer of technology in your Company
Correlation	Articulated Mission Statement	1.000	1.000	.166	.250	-.234	.047	-.087	.000	-.064	.307	-.056
	Articulated Strategic Company Plan	1.000	1.000	.166	.250	-.234	.047	-.087	.000	-.064	.307	-.056
	Existence of a strategic company planning process	.166	.166	1.000	.738	.426	.815	-.289	.212	.234	.483	.256
	developer of business strategy	.250	.250	.738	1.000	.719	.609	.203	-.109	.378	.202	.639
	Frequency of plan review	-.234	-.234	.426	.719	1.000	.478	.016	.000	.431	-.058	.594
	Communications	.047	.047	.815	.609	.478	1.000	-.308	.389	.185	.263	.254
	Performance measure	-.087	-.087	-.289	.203	.016	-.308	1.000	-.599	-.152	-.486	.257
	Performance rating	.000	.000	.212	-.109	.000	.389	-.599	1.000	.264	.563	-.078
	existence of technology department	-.064	-.064	.234	.378	.431	.185	-.152	.264	1.000	.089	.270
	existence of R and D manager	.307	.307	.483	.202	-.058	.263	-.486	.563	.089	1.000	.342
	developer of technology in your Company	-.056	-.056	.256	.639	.594	.254	.257	-.078	.270	.342	1.000
Sig. (1-tailed)	Articulated Mission Statement		.000	.323	.243	.258	.449	.406	.500	.431	.194	.439
	Articulated Strategic Company Plan	.000		.323	.243	.258	.449	.406	.500	.431	.194	.439
	Existence of a	.323	.323		.007	.110	.002	.209	.279	.258	.079	.237

	strategic company planning process											
	developer of business strategy	.243	.243	.007		.010	.031	.287	.382	.141	.288	.023
	Frequency of plan review	.258	.258	.110	.010		.081	.482	.500	.107	.437	.035
	Communications of Company Plan	.449	.449	.002	.031	.081		.193	.133	.305	.231	.239
	Performance measure	.406	.406	.209	.287	.482	.193		.034	.338	.077	.237
	Performance rating	.500	.500	.279	.382	.500	.133	.034		.231	.045	.416
	existence of technology department	.431	.431	.258	.141	.107	.305	.338	.231		.403	.225
	existence of R and D manager	.194	.194	.079	.288	.437	.231	.077	.045	.403		.167
	developer of technology in your Company	.439	.439	.237	.023	.035	.239	.237	.416	.225	.167	

Appendix

Communalities

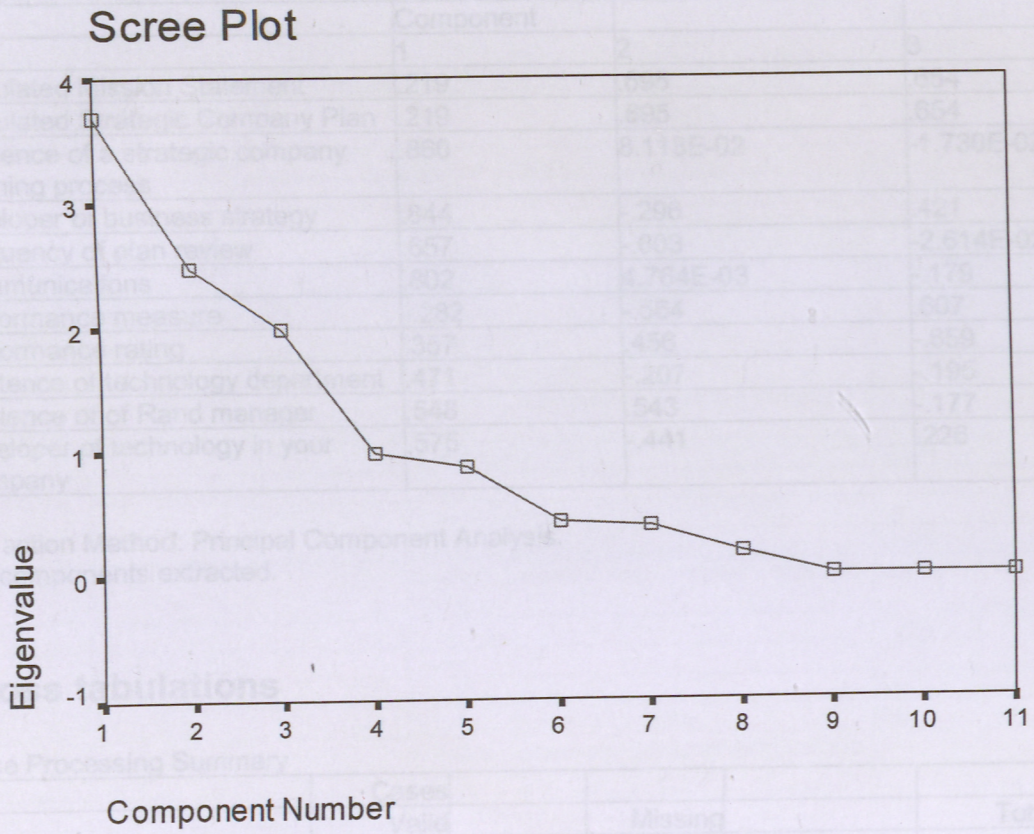
	Initial	Extraction
Articulated Mission Statement	1.000	.958
Articulated Strategic Company Plan	1.000	.958
Existence of a strategic company planning process	1.000	.747
Developer of business strategy	1.000	.977
Frequency of plan review	1.000	.795
Communications	1.000	.676
Performance measure	1.000	.766
Performance rating	1.000	.770
existence of technology department	1.000	.303
existence of Rand D manager	1.000	.626
Developer of technology in your Company	1.000	.577

Extraction Method: Principal Component Analysis

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.684	33.490	33.490	3.684	33.490	33.490
2	2.481	22.553	56.043	2.481	22.553	56.043
3	1.989	18.079	74.122	1.989	18.079	74.122
4	.976	8.870	82.992			
5	.869	7.896	90.888			
6	.421	3.827	94.715			
7	.401	3.643	98.358			
8	.175	1.588	99.946			
9	5.926E-03	5.388E-02	100.000			
10	-9.014E-17	-8.194E-16	100.000			
11	-2.035E-16	-1.850E-15	100.000			

Extraction Method: Principal Component Analysis.


Scree Plot
Eigenvalue
4
3
2
1
0
-1
1
2
3
4
5
6
7
8
9
10
11
Component Number

Component Matrix

	Component		
	1	2	3
Articulated Mission Statement	.219	.695	.654
Articulated Strategic Company Plan	.219	.695	.654
Existence of a strategic company planning process	.860	8.118E-02	-1.730E-02
developer of business strategy	.844	-.296	.421
Frequency of plan review	.657	-.603	-2.614E-02
Communications	.802	4.764E-03	-.179
Performance measure	-.282	-.564	.607
Performance rating	.357	.456	-.659
existence of technology department	.471	-.207	-.195
existence of of Rand manager	.548	.543	-.177
developer of technology in your Company	.575	-.441	.226

Extraction Method: Principal Component Analysis.
a 3 components extracted.

Cross tabulations

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Groups at Company * Understanding Company's Strategic Vision	39	78.0%	11	22.0%	50	100.0%

Groups at Company: Understanding Company's Strategic Vision Cross tabulation

			Understanding Company's Strategic Vision				Total
			Very Well	Well	Somewhat Well	Don't Understand	
Groups at Company	Senior Management	Count	8	0	0	0	8
		Expected Count	3.9	3.1	.8	.2	8.0
		% within Groups at Company	100.0%	.0%	.0%	.0%	100.0%
		% within Understanding Company's Strategic Vision	42.1%	.0%	.0%	.0%	20.5%
		% of Total	20.5%	.0%	.0%	.0%	20.5%
	Middle Management	Count	4	3	0	0	7
		Expected Count	3.4	2.7	.7	.2	7.0
		% within Groups at Company	57.1%	42.9%	.0%	.0%	100.0%
		% within Understanding Company's Strategic Vision	21.1%	20.0%	.0%	.0%	17.9%
		% of Total	10.3%	7.7%	.0%	.0%	17.9%
	Line Management	Count	3	4	2	0	9
		Expected Count	4.4	3.5	.9	.2	9.0
		% within Groups at Company	33.3%	44.4%	22.2%	.0%	100.0%
		% within Understanding Company's Strategic Vision	15.8%	26.7%	50.0%	.0%	23.1%
		% of Total	7.7%	10.3%	5.1%	.0%	23.1%
	The rest of Staff	Count	0	6	1	1	8
		Expected Count	3.9	3.1	.8	.2	8.0
		% within Groups at Company	.0%	75.0%	12.5%	12.5%	100.0%
		% within Understanding Company's Strategic Vision	.0%	40.0%	25.0%	100.0%	20.5%
		% of Total	.0%	15.4%	2.6%	2.6%	20.5%
	Technology Professionals	Count	4	2	1	0	7
		Expected Count	3.4	2.7	.7	.2	7.0
		% within Groups at Company	57.1%	28.6%	14.3%	.0%	100.0%
		% within Understanding Company's Strategic Vision	21.1%	13.3%	25.0%	.0%	17.9%
		% of Total	10.3%	5.1%	2.6%	.0%	17.9%
Total		Count	19	15	4	1	39
		Expected Count	19.0	15.0	4.0	1.0	39.0
		% within Groups at Company	48.7%	38.5%	10.3%	2.6%	100.0%
		% within Understanding Company's Strategic Vision	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	48.7%	38.5%	10.3%	2.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.828	12	.039
Likelihood Ratio	27.731	12	.006
Linear-by-Linear Association	6.211	1	.013
N of Valid Cases	39		

a 20 cells (100.0%) have expected count less than 5. The minimum expected count is .18.

Cross tabulations

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Best describes * Types of Technology	60	100.0%	0	.0%	60	100.0%

Appendix 4 Types of Technology Cross-tabulation

			Types of Technology						Total
			Information Systems	Product	Process	Bio-Technology	Others	6	
Best describes	Yes	Count	5	7	7	1	3	0	23
		Expected Count	3.8	3.8	3.8	3.8	3.8	3.8	23.0
		% within Best describes	21.7%	30.4%	30.4%	4.3%	13.0%	.0%	100.0%
		% within Types of Technology	50.0%	70.0%	70.0%	10.0%	30.0%	.0%	38.3%
		% of Total	8.3%	11.7%	11.7%	1.7%	5.0%	.0%	38.3%
	No	Count	5	3	3	9	7	10	37
		Expected Count	6.2	6.2	6.2	6.2	6.2	6.2	37.0
		% within Best describes	13.5%	8.1%	8.1%	24.3%	18.9%	27.0%	100.0%
		% within Types of Technology	50.0%	30.0%	30.0%	90.0%	70.0%	100.0%	61.7%
		% of Total	8.3%	5.0%	5.0%	15.0%	11.7%	16.7%	61.7%
Total		Count	10	10	10	10	10	10	60
		Expected Count	10.0	10.0	10.0	10.0	10.0	10.0	60.0
		% within Best describes	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	100.0%
		% within Types of Technology	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%	100.0%

Source: Research data

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.966	5	.002
Likelihood Ratio	22.864	5	.000
Linear-by-Linear Association	10.988	1	.001
N of Valid Cases	60		

a 6 cells (50.0%) have expected count less than 5. The minimum expected count is 3.83.

Cross-tabulations

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Capability Rating * Areas of Expertise	55	91.7%	5	8.3%	60	100.0%

Capability Rating: Areas of Expertise Cross-tabulation

			Areas of Expertise						Total
			Product R & D	Process R & D	Marketing Capability	Managing International Activities	Innovation & Entrepreneurship	Technological advancement	
Capability Rating	Below Average	Count	3	3	1	2	3	1	13
		Expected Count	1.9	1.9	2.4	2.4	2.4	2.1	13.0
		% within Capability Rating	23.1%	23.1%	7.7%	15.4%	23.1%	7.7%	100.0%
		% within Areas of Expertise	37.5%	37.5%	10.0%	20.0%	30.0%	11.1%	23.6%
		% of Total	5.5%	5.5%	1.8%	3.6%	5.5%	1.8%	23.6%
	Fairly below Average	Count	0	0	0	2	0	0	2
		Expected Count	.3	.3	.4	.4	.4	.3	2.0
		% within Capability Rating	.0%	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Areas of Expertise	.0%	.0%	.0%	20.0%	.0%	.0%	3.6%
		% of Total	.0%	.0%	.0%	3.6%	.0%	.0%	3.6%
	Average	Count	3	2	3	1	4	0	13
		Expected Count	1.9	1.9	2.4	2.4	2.4	2.1	13.0
		% within Capability Rating	23.1%	15.4%	23.1%	7.7%	30.8%	.0%	100.0%
		% within Areas of Expertise	37.5%	25.0%	30.0%	10.0%	40.0%	.0%	23.6%
		% of Total	5.5%	3.6%	5.5%	1.8%	7.3%	.0%	23.6%
	Fairly above average	Count	1	1	3	3	1	3	12
		Expected Count	1.7	1.7	2.2	2.2	2.2	2.0	12.0
		% within Capability Rating	8.3%	8.3%	25.0%	25.0%	8.3%	25.0%	100.0%
		% within Areas of	12.5%	12.5%	30.0%	30.0%	10.0%	33.3%	21.8%

		Expertise							
		% of Total	1.8%	1.8%	5.5%	5.5%	1.8%	5.5%	21.8%
	5	Count	1	2	3	2	2	5	15
		Expected Count	2.2	2.2	2.7	2.7	2.7	2.5	15.0
		% within Capability Rating	6.7%	13.3%	20.0%	13.3%	13.3%	33.3%	100.0%
		% within Areas of Expertise	12.5%	25.0%	30.0%	20.0%	20.0%	55.6%	27.3%
		% of Total	1.8%	3.6%	5.5%	3.6%	3.6%	9.1%	27.3%
Total		Count	8	8	10	10	10	9	55
		Expected Count	8.0	8.0	10.0	10.0	10.0	9.0	55.0
		% within Capability Rating	14.5%	14.5%	18.2%	18.2%	18.2%	16.4%	100.0%
		% within Areas of Expertise	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	14.5%	14.5%	18.2%	18.2%	18.2%	16.4%	100.0%

Source: research data

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.935	20	.292
Likelihood Ratio	22.675	20	.305
Linear-by-Linear Association	2.731	1	.098
N of Valid Cases	55		

a 30 cells (100.0%) have expected count less than 5. The minimum expected count is .29.

Cross-tabulations: Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Statements * Answer	82	91.1%	8	8.9%	90	100.0%

Cross-tabulation

Statements * Answer Cross-tabulation

			Answer					Total
			I strongly agree	I agree	I don't agree	I disagree	Strongly disagree	
Statements	Competition in this country is intense	Count	9	1	0	0	0	10
		Expected Count	4.6	2.1	1.6	.4	1.3	10.0
		% within Statements	90.0%	10.0%	.0%	.0%	.0%	100.0%
		% within Answer	23.7%	5.9%	.0%	.0%	.0%	12.2%
		% of Total	11.0%	1.2%	.0%	.0%	.0%	12.2%
	International competition is intense	Count	4	3	3	0	0	10
		Expected Count	4.6	2.1	1.6	.4	1.3	10.0
		% within Statements	40.0%	30.0%	30.0%	.0%	.0%	100.0%
		% within Answer	10.5%	17.6%	23.1%	.0%	.0%	12.2%
		% of Total	4.9%	3.7%	3.7%	.0%	.0%	12.2%
	New Corporate investments in R & D or manufacturing in the co	Count	2	3	1	1	2	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	22.2%	33.3%	11.1%	11.1%	22.2%	100.0%
		% within Answer	5.3%	17.6%	7.7%	33.3%	18.2%	11.0%
		% of Total	2.4%	3.7%	1.2%	1.2%	2.4%	11.0%
	Top Management has experience with innovation	Count	2	2	3	1	1	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	22.2%	22.2%	33.3%	11.1%	11.1%	100.0%
		% within Answer	5.3%	11.8%	23.1%	33.3%	9.1%	11.0%
		% of Total	2.4%	2.4%	3.7%	1.2%	1.2%	11.0%
	Decision to change machine setup is made at high level of Management	Count	6	2	0	0	2	10
		Expected Count	4.6	2.1	1.6	.4	1.3	10.0
		% within Statements	60.0%	20.0%	.0%	.0%	20.0%	100.0%
		% within Answer	15.8%	11.8%	.0%	.0%	18.2%	12.2%

		% of Total	7.3%	2.4%	.0%	.0%	2.4%	12.2%
	Decision to change to a new manufacturing process is made at top level of Mgt	Count	6	0	1	0	0	7
		Expected Count	3.2	1.5	1.1	.3	.9	7.0
		% within Statements	85.7%	.0%	14.3%	.0%	.0%	100.0%
		% within Answer	15.8%	.0%	7.7%	.0%	.0%	8.5%
		% of Total	7.3%	.0%	1.2%	.0%	.0%	8.5%
	New product introductions occur in all major markets simultaneous	Count	3	3	1	1	1	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	33.3%	33.3%	11.1%	11.1%	11.1%	100.0%
		% within Answer	7.9%	17.6%	7.7%	33.3%	9.1%	11.0%
		% of Total	3.7%	3.7%	1.2%	1.2%	1.2%	11.0%
	Technology has enabled our company to improve product quality	Count	6	2	1	0	0	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	66.7%	22.2%	11.1%	.0%	.0%	100.0%
		% within Answer	15.8%	11.8%	7.7%	.0%	.0%	11.0%
		% of Total	7.3%	2.4%	1.2%	.0%	.0%	11.0%
	Technology has enabled our company to increase our prices	Count	0	1	3	0	5	9
		Expected Count	4.2	1.9	1.4	.3	1.2	9.0
		% within Statements	.0%	11.1%	33.3%	.0%	55.6%	100.0%
		% within Answer	.0%	5.9%	23.1%	.0%	45.5%	11.0%
		% of Total	.0%	1.2%	3.7%	.0%	6.1%	11.0%
Total		Count	38	17	13	3	11	82
		Expected Count	38.0	17.0	13.0	3.0	11.0	82.0
		% within Statements	46.3%	20.7%	15.9%	3.7%	13.4%	100.0%
		% within Answer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	46.3%	20.7%	15.9%	3.7%	13.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	50.795	32	.019
Likelihood Ratio	57.522	32	.004
Linear-by-Linear Association	5.570	1	.018
N of Valid Cases	82		

a 45 cells (100.0%) have expected count less than 5. The minimum expected count is .26.

Communalities

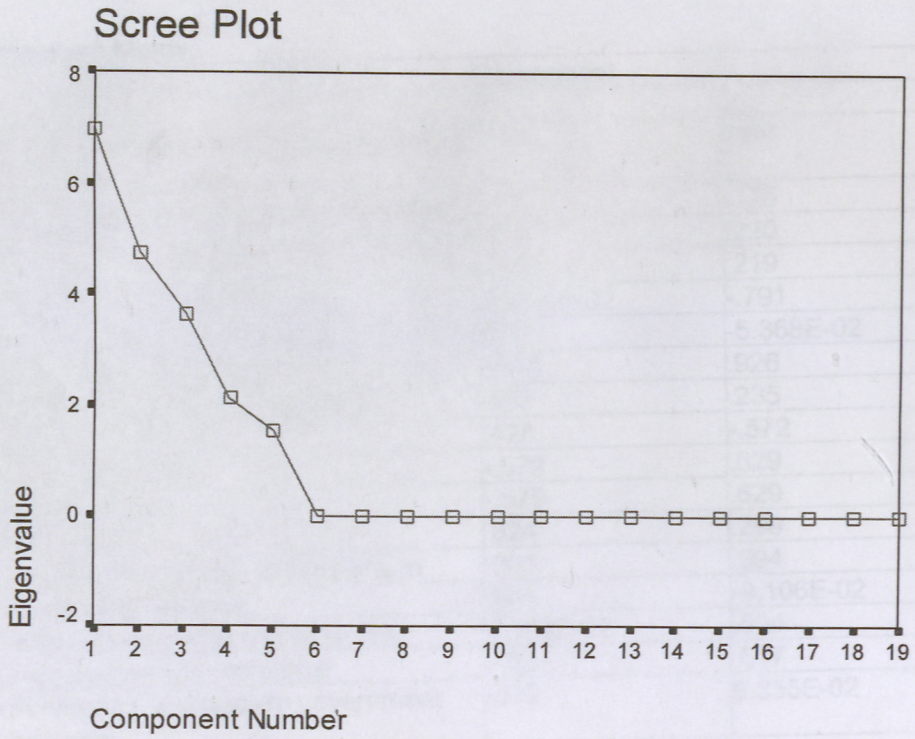
	Initial	Extraction
investment in r&d as a percentage of profit	1.000	1.000
investment in r as a percentage of profit	1.000	1.000
investment in d as a percentage of profit	1.000	1.000
frequency of new products	1.000	1.000
frequency of new technologies	1.000	1.000
technology as a competitive tool	1.000	1.000
technological turbulence	1.000	1.000
agressiveness of firms strategy	1.000	1.000
Research leadership	1.000	1.000
Product leadership	1.000	1.000
Process leadership	1.000	1.000
legth of product cycle	1.000	1.000
technological product differatiation	1.000	1.000
technological advance	1.000	1.000
number of competing technologies	1.000	1.000
forced product obsolescence	1.000	1.000
technological response to government regulations	1.000	1.000
technological response to consumer pressures	1.000	1.000
Competitive intensity	1.000	1.000

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.981	36.744	36.744	6.981	36.744	36.744
2	4.720	24.841	61.584	4.720	24.841	61.584
3	3.626	19.085	80.669	3.626	19.085	80.669
4	2.133	11.228	91.897	2.133	11.228	91.897
5	1.540	8.103	100.000	1.540	8.103	100.000
6	7.432E-16	3.912E-15	100.000			
7	4.716E-16	2.482E-15	100.000			
8	2.844E-16	1.497E-15	100.000			
9	1.850E-16	9.737E-16	100.000			
10	1.591E-16	8.374E-16	100.000			
11	9.124E-17	4.802E-16	100.000			
12	-6.466E-32	-3.403E-31	100.000			
13	-8.985E-18	-4.729E-17	100.000			
14	-4.485E-17	-2.361E-16	100.000			
15	-1.079E-16	-5.680E-16	100.000			
16	-2.973E-16	-1.565E-15	100.000			
17	-3.498E-16	-1.841E-15	100.000			
18	-4.259E-16	-2.242E-15	100.000			
19	-1.652E-15	-8.693E-15	100.000			

Extraction Method: Principal Component Analysis.


Scree Plot
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8
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Component Number

Component Matrix

	Component				
	1	2	3	4	5
investment in research & development as a percentage of profit	.105	.980	-5.700E-02	-8.802E-02	-.130
investment in r as a percentage of profit	.690	.175	-.306	-.519	.361
investment in d as a percentage of profit	.830	.220	-.239	-.453	3.397E-02
frequency of new products	.766	.219	-9.132E-02	7.621E-02	-.593
frequency of new technologies	-8.817E-02	-.791	.585	3.646E-02	.154
technology as a competitive tool	.677	-5.368E-02	-.141	.720	2.391E-02
technological turbulence	-.248	.926	-.189	-.206	4.917E-02
aggressiveness of firms strategy	.457	.235	-.678	.429	.305
Research leadership	.428	-.572	-.173	7.782E-02	.673
Product leadership	-.579	.629	.103	.465	.204
Process leadership	-.579	.629	.103	.465	.204
length of product cycle	.824	.299	-.410	-.253	-1.533E-02
technological product differentiation	.301	.394	.714	-.266	.418
technological advance	.801	-9.106E-02	.589	4.282E-02	3.877E-02
number of competing technologies	4.482E-02	.504	.797	-.205	.256
forced product obsolescence	.435	.617	.588	.292	-7.402E-03
technological response to government regulations	.835	6.355E-02	.452	.156	-.265
technological response to consumer pressures	.807	-.270	.460	.213	-.137
Competitive intensity	.824	8.698E-02	-.365	.357	.229

Extraction Method: Principal Component Analysis.
a 5 components extracted.