A viability study in terms of business opportunities for echinoderms (sea urchins) in South Africa.

by

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SAMEVATTING

SAKE GELEENTHEDEN VIR ECHINODERMS (SEE-PAMPOENE) IN SUID AFRIKA

Inleiding

Sedert die vrylating van Nelson Mandela in Februarie 1990 het die internasionale markte stadig vir Suid-Afrikanse handel heropen. Voorheen agtergeblewe sake areas soos akvakultuur en gespesialiseerde seevoedselsoorte wat voorheen uitsluitlik deur die Ooste bemark is het nou lewensvatbare sakegeleenthede vir Suid-Afrika geword met herinstelling van direkte vlygroetes en formele handelskanale.

Terselfdertyd het die politieke arena in Suid-Afrika verander met die ANC wat die dominante politieke party geword het. Regeringsinstansies, insluitend die Departement van Seevisserye, is onderhewing aan 'n veranderingsproses om die nuwe klem op werkskepping, deursigtigheid en demokrasie te reflekteer.

'N Venster van geleentheid is vir entrepreneurs oopgemaak om lisensies en permitte te verkry wat voorheen uitsluitlik beskikbaar vir 'n geselekteerde minderheid was. Kleiner operateurs is die geleentheid gebied om die nodige vergunning te verkry om nis-markte te ontwikkel en sodoende werkgeleenthede te skep.

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Doelwitte van die studie

Die hoofdoelwit van hierdie studie is om die kwessies rakende die identifisering en evaluering van lewensvatbare sake geleenthede vir die ontginning van see-pampoene in Suid-Afrika te ondersoek.

Die spesifieke doelwitte van die studie is as volg:
Om die bronne vir nuwe sake idees te identifiseer and terselfdertyd 'n lys van kriteria saam te stel wat gebruik kan word om die sake geleenthede vir echinoderm te evalueer. Hierdie kriteria sluit punte soos die spesifieke industrie, die spesifieke mark asook relatiewe winsgewendheid en fatale-fout-identifisering, in.

Om die kernareas in die see-pampoen-industrie te beskryf en te identifiseer.

Om 'n begrip te ontwikkel vir die mark met spesifieke verwysing na potensiële winsgewendheid, die belangrikheid van kwaliteit, die lewensiklus, ontginning en prosessering van see-pampoene.

Laastens om die moontlikheid vir die daarstelling van 'n see-pampoen sakeonderneming te ondersoek en te evalueer aan die hand van die saamgestelde lys van evalueringskriteria. Om dan 'n aanbeveling te maak oor die moontlikheid vir die suksesvolle kommersialisering van see-pampoene met inagneming van die Suid-Afrikaanse omgewing.

Metode van studie

Verskeie onderhoude is gevoer met spesialiste in die spesifieke areas van die studie. Dit is gekombineer met ter plaatse navorsing en sekere basiese statistiese data rakende verspreiding-en opbrengsverhoudings. 'n Literatuur
studie is gedoen om spesifieke ekonomies lewensvatbare krieteria en probleemareas te identifiseer en metodes vas te stel wat individuele lande gebruik het om dit te oorkom. ‘n Basiese teoretiese raamwerk vir ‘n nuwe onderneming is ook uit die literatuurstudie bekom.

Sakegeleenthede vir echinoderms

Die mark vir kwaliteit seepampoeneiers het substantieel oor die laaste dekade gegroei. Met die stygende koopkrag van die Ooste en spesifiek Japan oor die laaste dekade, het die vraag na “uni sushi” oftewel seepampoeneiers vinniger gegroei as wat die tradisionele Oosterse produsente kon verskaf. Westerse seepampoeneiers is egter meer geredelik en gereeld aanvaar.

Suid-Afrika het groot getalle seepampoene wat nie kommersieël geoes word nie. Ongeskoolde arbeid is geredeliker beskikbaar in die Westelike Kaap en gemeenskappe is op soek na addisionele werk buite die tradisionele industrieë soos kreef en vis wat moeilike tye deurgaan.

Internasionale makelaars en kenners was ook bereid en beskikbaar om die nodige kennis en kapitaal te investeer om te verseker dat die potensieële sake inisiatief op ‘n gesonde voet begin. Navorsing met betrekking tot die lewensvatbare sakegeleenthede in die seepampoenbedryf het dus groot meriete ingehou.
Bevindinge

Die areas waarvoor die nodige regeringsgoedkeurings vir ontginning verkry is het nie 'n bevredigende opbrengs gegee om die sake-inisiatief kommersieel te begin nie. Die areas wat wel die nodige opbrengs getoon het, het binne die winsgewende perlemoen-areas geval. Navorsing het getoon dat jong perlemoen beskerming verkry deur naby die skerp punte van die seepampoen te skuil. Die verwydering van groot getalle seepampoene kon die jong perlemoene in gevaar stel en sodoende die voortgaande reproduksie van die spesie erg benadeel. Amptelike toestemming tot hierdie areas kon dus nie bekom word nie.

Alhoewel daar 'n uitvoergeleentheid vir seepampoeneiers is sal dit slegs 'n lonende sakeonderneming wees indien die areas (wat uitgesluit is vir ontginning) vir 'n minimum van vyf jaar oopgestel kan word sodat voldoende hoeveelhede kwaliteit seepampoeneiers geoos kan word.

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CHAPTER 1: INTRODUCTION

1.1 Background

Southern Africa has a particularly rich variety of marine fauna and flora along its more than 3000 km coastline. It includes over 10 000 species, or almost 15% of all coastal marine species known worldwide (Branch, 1994:7). Compared to some of the Asian countries, South Africa utilises relatively few of these species for commercial or aquaculture purposes. This slow development has been mainly attributable to a highly developed marine fishing industry which could effectively meet consumer needs at a more competitive price than that at which the other products could (De Villiers, 1984:146).

As South Africa re-enters the international arena and is exposed to different cultures and new markets, opportunities arise for various products that previously had little or no commercial value in South Africa. Jellyfish (Scyphozoa), Red Bait (Pyura stolonifera), Sea Lettuce (Ulva), Sea Urchins (Echinoderms) and Alikreukel (Turbo sarmaticus) are all examples of products that are utilised as food sources in certain parts of the world (Hecht, 1990:2) and which are found in South Africa.

1.1.2 The South African economy

Approximately 33% of the South African population is officially unemployed (CSS, 1995:2). Economic growth for the period 1990 to 1995 averaged around 2.3% per annum. In 1995, 2 out of 100 school leavers found employment in the formal sector. The average per capita income per South African is US$3000 per annum (CSS, 1995:5).
It is foreseen that the majority of new employment will come from small and medium type enterprises. In the USA approximately 49.7% of the nation is employed by small firms (less than 500 employees or $3.5 mil annual turnover) (Longenecker & Moore, 1991:41). In this view the South African government encourages the formation of small to medium and micro enterprises (known as SMME's). The emphasis must thus be to stimulate entrepreneurial activity. Small businesses have an important role to fulfill in the overall economic picture.

1.1.3 The fishing industry in South Africa

The highly regulated fishing industry is in the process of undergoing major changes. The South African fishing industry was characterised by political interference, nepotism and the granting of privileges to certain groups. This has not ended with the advent of the new administration (Marais, 1997:10). In the new order there is a perception that existing legislation regulating the industry is in conflict with the Constitution. Recently several non-fisherman insisted on receiving licenses, such as notorious Cape gangs, and even Pagad entered the fray. From this background new legislation was introduced. The Marine Living Resources Bill purports to provide access to marine living resources in a fair way, whilst at the same time preserving and protecting the nation's marine resources. The policy aims to broaden access and to deliver empowerment by means of three major steps (Macreggor, 1997:8-9):
1. Restructuring existing companies;
2. Distributing access rights beyond current players;
3. Renting out access rights for short time periods (for instance one fishing season).
The fishing industry as a whole has grown to a wholesale value of over R1.7 billion a year, and creates 27 000 direct and 100 000 indirect jobs. This is broken down into the following major sections; see figure 1.

**Figure 1:**

![Pie chart showing SA Fishing Industry Commercial catches, landings and values (1995 - total R1.7 billion)](source: Marais, 1997, p11)

Throughout this tempestuous era, the larger players such as Irvin & Johnson (I&J) and Oceana Fishing managed the majority of the fishing resources. At one stage I&J controlled 45% of the quota for white fish and Oceana 38% of the Pelagic quota. The Quota Board, set up in 1990, thus lost the confidence of smaller role players as it was seen as only catering for the large players. Several of the smaller players were dismissed as “poachers”, but these were merely people who wished to earn their daily living from the sea. Legislation and tighter controls forced their activities underground. In many fishery zones matters have
gotten out of hand. In Hawston there have even been shootings involving informal fisherman, divers, local residents, police fishery inspectors and existing quota holders.

Several of these illegal groupings have petitioned to government to become legal and several have formed co-operatives, based on geographical regions, to tender for licenses or quotas. Two of the important catches for these groupings are abalone, with earnings of R54m in 1995 and rock lobster earnings R186m in 1995. The illegal trade in both these two resources is at least, according Johnston (Marais, 1997:11) the same as the legal catchment.

These two catches are important as the sea urchin, abalone and rock lobster form an integral part of the natural life cycle process, interacting with and influencing each other. Involvement and investment in the sea urchin industry will have to take cognisance of this. In addition to be successful over the medium to long term they will also have to address and involve the communities and groupings that are so closely involved with these catchments.

1.2 Problem statement

Aquaculture, sometimes referred to as “farming the sea”, does have several characteristics in common with traditional farming. Although there is a lot of research on traditional farming and several books on new venture creation, there are few references to identifying business opportunities in aquaculture, and none on business opportunities for echinoderms. The South African fishing industry has few examples of small and successful businesses. This created the impression that to be successful you had to be a large, resource rich company, thus dissuading
smaller entrepreneurial ventures. There is a void in business literature on how to find, evaluate and decide on possible business opportunities in the marine industry.

The chances of failing in a new venture are high. Timmons, (1995:10) in quoting the Wall Street Journal, states that 62.7% of small businesses that failed in the USA, fail within the first six years of operation. In evaluating a business opportunity these risks had to be considered. It is thus important to review the reasons for these failures. Research on identifying criteria for the evaluation of business opportunities varies from the very personal characteristics of the entrepreneur to the larger economic issues, such as the industry and legal and regulatory framework. Establishing specific criteria for the evaluation of this venture relied on combining some strategic points (Drucker, 1994:191) along with more detailed analyses as proposed by Timmons (1995: 93-94) and Deakins (1996:190-197).

The changing political scenario in South Africa created several opportunities but also left several questions unanswered. The creation of a new policy document for the Sea Fisheries Industry, with the aim of making it more inclusive and transparent with the specific aim of empowering previously disadvantaged communities, was not very clear. It's interpretation and effect on the industry is still to be determined.

As each business has certain critical factors that are unique to the industry, it is important to establish the key important points that make this specific business successful. As it is a relatively new industry in the West, gaining information from traditional sources was restricted subsequently more information was garnered from personal interviews and interaction with leaders in the field.
1.3 Goals and objectives

The main objective of this study is to investigate the issues relating to the identification and evaluation of a business opportunity for the harvesting of echinoderms in South Africa.

The specific objectives of this research can be stated as follows:

1. To identify sources for innovative opportunities and also to look at the reasons for the failure of new enterprises. To then list various criteria for the assessment of new ventures. From this a criteria list will be chosen that is suitable for the evaluation and assessment of a business opportunity for echinoderms. This set of criteria will include aspects such as the specific industry and market, as well as the relative profitability and fatal-flaw issues pertaining to this industry.

2. To describe and identify the key issues in the commercialisation process of the sea urchin industry. To develop an understanding of the market with specific reference to potential profitability, the importance of quality and the lifecycle, harvesting and processing of sea urchins.

3. To evaluate, according to the criteria list determined in chapter two, the possibility and suitability for the establishment of a sea urchin new business venture in South Africa. To make a recommendation on the possibility of the successful commercialisation of sea urchins, taking into consideration the realities of the South African environment.
1.4 Methodology

This study consists of a literature study in the form of textbooks, business and technical periodicals and other publications such as the Internet, regarding the theoretical framework for the evaluation of new entrepreneurial business ventures. Relevant information regarding the distribution, regulation, market demand and supply of sea urchins is garnered from literature studies, personal interviews and limited sampling.

No intensive physical study of the distribution of sea urchins was undertaken due to the costs and time required. Limited sampling was undertaken as an indication of the viability of harvesting in a certain area, but it is not the emphasis of this study.

International representatives have been to South Africa to investigate the viability of South African sea urchin industry and have been consulted intensively. Ongoing discussions with these and other informed sea food market specialists and researchers have made an important contribution to this study.

The general literature on sea urchins seldom recognises the unique challenges that face existing and potential businessmen. This study intends to convey some of these challenges so as to make an objective and critical assessment of the business opportunity for sea urchins in South Africa.
1.5 Outline of the study

Chapter two: In this chapter sources for business opportunities are discussed and various criteria for the evaluation of entrepreneurial businesses are investigated. The purpose of the chapter is to create a framework, or set of criteria against which this business opportunity can be evaluated.

Chapter three investigates the commercialisation aspects, from the product and process of extracting the sea urchin roe in detail to the quality and market for urchins. The chapter begins with a look at the lifecycle of the sea urchin and its development growth and feeding. The harvesting and processing is expanded upon with detailed photos of the roe extraction in an urchin-processing factory.

Chapter four focuses on the key issues in the development of the sea urchin industry with specific reference to the list of criteria as established in chapter two. Some of the main areas that are covered include the potential profitability, the importance of quality and the lifecycle, harvesting and processing of sea urchins. Specific concerns from the department of Sea Fisheries are highlighted, especially the interaction between the various species and its impact on the future of the sea urchin fishery. Finally, the findings of the study are summarised, conclusions reached and recommendations made. The conclusions are compared to the initial objectives of the study as stated in chapter one.
CHAPTER 2   CRITERIA SELECTION

2.1    Introduction

According to Timmons, (1995: 87) "An opportunity has the qualities of being attractive, durable, and timely and is anchored in a product or service which creates or adds value for its buyer or end user." Opportunities that have these qualities usually remain "open" long enough for the entrepreneur to take advantage of them. Furthermore the market that is being entered must be feasible and the management team able to exploit it. The venture is or will achieve a competitive advantage or degree of differentiation at an economically viable point that allows for significant profit and growth potential.

2.2    Sources for innovative opportunities

Successful business ventures had to have started from somewhere, and usually it is an idea that sparks the process. It is important to understand and recognise the various sources for innovative business opportunities as the initial step in the development of new ventures.

Drucker, (1994:31) argues that the knowledge base of entrepreneurship is the discipline of innovation, which is a "diagnostic discipline: a systematic examination of the areas of change that typically offer entrepreneurial opportunities". According to Vesper (Gumpert, 1983:29) many books on entrepreneurship completely neglect the subject or origination of new-venture ideas. Writers that do, group these sources or origination in two categories, internally and externally (Drucker 1994, Schölhammer 1979). Most writers do agree that successful entrepreneurship has little to do with luck, and that the old adage holds true that successful new ventures are
found by a continued process where perspiration and preparation meet opportunity.

Internal sources for innovative opportunities according to Drucker, (1994:31 - 36) are:

- **The unexpected** – the unexpected success, the unexpected failure, or the unexpected outside event. The classic example of 3M's post it notes serves as an example where the search for a super strong glue only delivered a weak glue, (unexpected failure) which was developed into a billion dollar industry.

- **The incongruity – between reality as it actually is and reality as it is assumed to be or as it “ought to be”**. Incongruity is, like the unexpected event, a symptom of change, either change that has already occurred or change that can be made to happen. Shipping in the fifties was seen as a dying industry as ships were spending more and more time loading and offloading cargo. Although faster and more economical ships were being built the reality was that loading cargo on and off ships took too long, and by concentrating efforts on better and faster ships the real problem was not solved. Shipping was saved when they uncoupled loading from stowing. The loading was now done on land, and all that had to be done was to put on and take off pre-loaded freight. This was the start of the roll-on roll-off ship and container ships.

- **Innovation based on process' need** or as Schollhammer, (1979:30) puts it “necessity is the mother of invention”. For twenty or more years people knew that there was going to be an electric power industry. For the last five or six years of that period it became abundantly clear that the “missing link” was the light bulb. Edison defined the new knowledge needed to convert this potential electric power industry into an actual one, went to work and had a a light bulb within two years.
Changes in industry structure or market structure that catch everyone unawares. The automobile industry in the early years of this century grew so fast that its markets changed drastically. The founders of Rolls Royce realised that the automobile industry was growing so quickly that cars would become "common", and deliberately set out to build and sell an automobile that was aimed at the extremely wealthy.

The second set of sources for innovative opportunity involves changes outside the enterprise or industry:

- **Demographical changes.** In developed countries the family size is decreasing and the age of the average age of the population is increasing. With a limited growth potential of new young students higher education institutions targeted more and more people in their thirties and forties that wanted advanced professional training or retraining. The effect was a much larger target market for these institutions.

- **Changes in perception, mood and meaning.** Traditionally, the way people feed themselves was that ordinary people "ate" and the rich "dined". Now the same people eat and dine. A new trend is "feeding" - the simplest and easiest way for very busy people to get the necessary sustenance. A new market for fast foods, frozen and TV dinners evolved.

- **New knowledge, both scientific and nonscientific.** Although the British conceived, designed and built the first passenger jet plane, the company De Havilland did not get the payloads for the different routes right, nor did they work out a way to finance the purchase of the expensive planes. History showed that the American company, Boeing, did.
Opportunities exist for only a specific period of time. Markets grow at different rates over time and as a market becomes larger more opportunities arise. As the market becomes larger and more structured the window of opportunity that existed begins to close (Timmons, 1995:89 - 90). The ability to recognise a potential viable opportunity, and the sense of timing to seize it as the window of opportunity opens, are critical (Timmons, 1995:92).

Several sources for innovative opportunities as identified by Drucker are present in the South African Fishing industry. The *incongruity* that a successful marine venture has to be run by a large multinational company with a large capital base is not necessarily true. The *changes in the industry structure* are at present forced upon the big companies by the change in the political ruling party assisting smaller players from previously disadvantaged communities to play an active role in this industry. The new knowledge that there are international markets for products that do not have any commercial value in South Africa at present is another window that can be exploited by entrepreneurs.

### 2.3 Reasons for failure

Successful business ventures are opportunities that were built with the entrepreneurial imagination and resources available to the entrepreneur. The entrepreneur has to choose between several opportunities available to him at a given time. Choosing the incorrect opportunity could lead to economic and social disaster. Thus the screening process is of utmost importance. By looking at the reasons why many businesses fail the entrepreneur can avoid the pitfalls that are common to starting a new venture.
According to Schöllhammer, (1979:53) the factors underlying the failure of new ventures is in most cases within the control of the entrepreneur. The American credit reporting company Dun & Bradstreet states that business failures can be ascribed primarily to managerial inability and a lack of managerial competence and experience (Cronje, 1987:416).

Du Plessis, (1993:649) lists the major factors that lead to business failures, and regardless of the industry, managerial incompetence and insufficient experience are shown to be the leading reasons for failure. Other reasons often cited for business failures are (Schöllhammer, 1979:54):

- **Inadequate market knowledge.** This includes a lack of information about the demand potential, the present and future size of the market.

- **Ineffective marketing and sales efforts.** Inadequate or misdirected promotional efforts or specific problems with unfamiliar markets often result in failure.

- **Inadequate awareness of competitive pressures** sometimes catches entrepreneurs when they do not take their competitors' reactions into account.

- **Faulty or inferior products.**

- **Undercapitalisation, unforeseen operating expenses, or excessive investments** often lead to cash flow problems, which is one of the major causes of new venture failures.

A comprehensive and systematic feasibility analysis should identify these dangers, if they exist, and indicate ways of controlling them. Entrepreneurs should ensure that they do avoid these pitfalls before they undertake a new venture.
2.4 Criteria for evaluating business opportunities

According to Cartland, (1990:249) the final determination of the viability of a product or service frequently comes down to a subjective determination of whether the sales level required to break even can be achieved in a given market area. The prospective entrepreneur must decide whether there is a high enough probability for success of a given product in a given market area to continue the planning process. If the decision is positive, then the remaining steps of the business plan should be addressed.

Various writers agree with Cartland. Several criteria have been developed by different writers to assist entrepreneurs in selecting the best, or correct, opportunity. Deakins, (1996: 190 – 197) lists 10 factors that assist entrepreneurs in identifying growth opportunities. They are:

1. **Characteristics of the entrepreneur**, e.g. the age of the entrepreneur, characteristics i.e. ambition and professional associations and qualifications.

2. **Managerial skills**, such as a team that could contribute management skills and add intellectual capital.

3. **The degree of exporting associated with growth**, with the hypotheses being that there are limits to the local market, and that exposure to markets outside the local area will assist continued growth.

4. The **specific business sector** that is chosen could prove to be an indication of potential success, with the high technology sector being favoured at present.

5. The **degree of enterprise support** could be of assistance and determine the success of the venture. Certain industries, for example are at times favoured and receive preferential treatment. The building of the Sun City Hotel and Casino in Bophatatswana
was facilitated by an accelerated capital tax write off and the granting of an exclusive gambling licence.

6. The venture should be **relatively profitable**, meaning that the company should be able to meet commitments and have a significant surplus afterwards.

7. The *life cycle of the firm and or product* is important as firms usually achieve the fastest growth shortly after start-up and in their third lifecycle stage they achieve the maximum growth rate.

8. The *economic environment* will impact on all companies but more so in certain industries than others. For instance, open pit mining has been refused in several areas due to the impact it might have on the immediate environment.

9. The *ability to network with other firms* that could assist a start-up operation in overcoming some of the initial obstacles.

10. A *legal and regulatory environment* that encourages venture opportunities.

Schöllhammer, (1979:54-55) identifies five key feasibility areas in assessing the feasibility of a new venture. These are:

1. **Product or Service.** Under this heading areas such as critical technical specifications and engineering requirements are investigated. The product development and product testing is also included.

2. **Market.** Market potential is analysed with regard to the identification of potential customers and the potential market share and the potential sales volume is then assimilated into sales projections. The product is then test marketed. Several planning issues such as promotion, distribution packaging and price differential are looked at under this heading.

3. **Financial Resources.** The necessary financial requirements are compared to the available resources. Any additional borrowing
costs are then calculated. Fixed costs and variable costs are separated and then projected cash flows and profitability are worked out.

4. **Organisational abilities.** These are analysed taking into account the required skill levels, and what is at hand with the potential organisation development of the future.

5. **Competition.** Existing competitors are investigated, taking into consideration their potential reactions to newcomers and the possibility of new competitors entering the market.

Karl Vesper (as adapted by Kuratko, 1992:180) created “A New Venture Idea Check List”. This checklist covered the same areas as Schollhammer, but added one or two additional checks and rearranged the order:

1. **Basic feasibility of the venture.** This is an introductory question that quickly sifts through various proposals. They are:
   - Is it legal?
   - Can the product or service work?

2. **Competitive advantages of the venture.** Similar aspects to Schollhammer are covered by Vesper but the importance of having a competitive advantage over competitors is highlighted right in the beginning of his checklist.

3. **Buyer decisions in the venture.** This looks at the target market, size and serviceability of the proposed consumers.

4. **Marketing of the goods and services.** Promotion, pricing and distribution aspects are dealt with in this segment.

5. **Production of the goods and services.** This is similar to Schollhammer’s product or service segment where the technical details are broken down e.g. delivery times and quality control.

6. **Staffing decisions in the venture.** The same issues as covered by Schollhammer, e.g. existing competencies vs. future
requirements and ways of obtaining the necessary skills and / or personnel.

7. **Control of the venture** looks at company structure responsibilities and controls over the various aspects of the venture. This is an aspect that is not covered by Schöllhammer and is sometimes overlooked by entrepreneurs. Decisions taken now can decide who ultimately controls the venture.

8. **Financing the venture.** Again profitability, cash flows and return on equity and potential borrowings calculations, must be in place beforehand as to ensure that venture does make money and do not run out of funds when it is growing.

Timmons’ (1995:93 – 104) list of criteria in evaluating ventures starts from the same principle as the previous writers, but make it more specific in relation to the individual entrepreneurial opportunity. Eight major categories are used as a checklist for evaluating venture opportunities, viz.:

1. **Industry and market.** The higher potential businesses are those that can identify a market niche for a product that meets an important customer need and provides high value-added benefits to the customer within a three-year period. **Market structure.** A fragmented, imperfect market or emerging industry often contains vacuums that can be filled by niche companies. Industries that are perfectly competitive, or are mature or declining are unattractive. **Market size.** Entrepreneurs are on the lookout for large growing markets, but markets that are not too big to attract the attention of the really big corporations. **Growing markets** assist the new entrant in capturing a slice of the market without taking too much away from existing competitors. **Market capacity.** If there is still a growing demand while the industry is at full capacity an opportunity exists. **Cost structure.** Opportunities exist for a venture if it can
become a low-cost provider especially where economies of scale are insignificant.

2. **Economics.** Several key indicators are used in evaluating ventures from an economic angle. *Profits after tax* should be in the region of 10–20 percent or more, and anything less than 5 percent is dubious. *ROI potential* of 25 percent or more is very attractive according to Timmons, (1995: 98). **Capital requirements.** If the venture needs too much money or cannot be funded, it is unattractive. **Gross Margins.** Margins exceeding 40-50% provide a built-in cushion that allows for more error and more flexibility to learn from mistakes. High and durable gross margins, in turn, mean that a venture can reach breakeven earlier, an event that should occur within two years.

3. **Harvest issues.** **Value added potential.** New ventures that are based on strategic value in an industry, such as technology, are attractive, while those with low strategic value are less attractive. Ventures with large capital investments, and whose value on exit can be severely eroded by unanticipated circumstances, are less attractive. An example would be mining. **Exit mechanism and strategy.** Unattractive opportunities do not have an exit mechanism. It is important to understand the likelihood of harvesting by either selling or exiting a business from the outset.

4. **Competitive advantage.** **Variable and fixed costs.** An attractive opportunity has the potential for being the lowest-cost producer and for having the lowest costs of marketing and distribution. **Degree of control.** Having potential control over prices, costs and channels of distribution makes an opportunity attractive. **Entry barriers.** To be able to gain a proprietary protection, regulatory advantage, or other legal or contractual advantage, such as exclusive rights to a market is attractive. If a firm cannot keep others out, or it faces existing entry barriers, it is unattractive.
5. **Management team. Entrepreneurial team.** Attractive opportunities have existing, strong teams. *Industry and technical experience.* A management with a proven track record is highly desirable. *Integrity* and trust is major long-term advantage for entrepreneurs, and should be sought at all times from personnel and investors.

6. **Fatal flaw issues.** If any of the previously mentioned criteria are not met, the venture becomes unattractive. Although there are examples of successful ventures where a dominant strength in any one of these criteria translated into a winning enterprise, a flaw in any one can be fatal. It is difficult to predict all fatal flaws as it depends on the individual circumstances of the opportunity, and the investor will ultimately have to decide if they are fatal to the opportunity.

7. **Personal criteria. Goals and fit.** Entrepreneurs have to decide if there is a match between the requirements of the opportunity and what they want from it. *Upside/downside issues* and *Opportunity costs.* Entrepreneurs must decide if they are prepared to take the positives as well as the potential negatives that could come with the venture. Every venture takes time and there is an opportunity cost that must be calculated by the individual. The examination of personal goals and objectives serves two purposes. It forces a prospective owner to examine whether he or she is personally willing to pay the price for success in the new business, and forces a recognition of what that price will be.

8. **Strategic differentiation. Degree of fit.** There must be a good fit between founders, the team and resource requirements and the timing. *Team.* A strong experienced, entrepreneurial team is essential for growth. Other aspects that come into play, and that have been covered before are: the *correct timing,* having the necessary *flexibility,* being *opportunity orientated,* pricing *correctly,* ensuring *optimum distribution* and always leaving room for error.
2.5 Summary

Du Plessis (1993:649) states that the most common reasons for business failure are the lack of understanding of the market and inferior products. The first point in Timmons' criteria list focuses on the industry and market. This is of utmost importance as no correct analysis of a new venture's viability can be done if there is not a full understanding by the potential investor of the exact market that he/she intends to venture into. Timmons does not highlight the importance of the product as such in his criteria list although inferior products are one of the most common reasons for failure. Timmons' fatal flaw aspect, point six, is however very important as it is an "abort checkpoint". If the venture has a fatal flaw, regardless of everything else being perfect, it could cancel the potential venture. This fatal flaw aspect is in line with Cartland's "subjective determination" criteria. Various probabilities are difficult or impossible to quantify accurately. If the entrepreneur is not totally convinced of the probability of success, it should be seen as a fatal flaw and the venture abandoned. Timmons' list of eight criteria is seen to incorporate the broadest and most appropriate checklist. Chapter three will concentrate on the industry, market and product in more detail, thus ensuring a thorough understanding of the market and product, avoiding one of the weaknesses in Timmons' criteria. In chapter four the business opportunity for echinoderms in South Africa will be evaluated against the eight factors as outlined especially by Timmons in this chapter.
CHAPTER 3
DEVELOPING AN UNDERSTANDING FOR THE PRODUCT

3.1 Sea urchins: a background

Sea urchins, class Echinoidea, belong to the family Echinoidea that includes the starfish, brittlestars, sea cucumbers and feather stars. There are some 58 species of urchins that occur in Southern Africa (Clark, 1976:4). Urchins are common from intertidal pools to depths of more than 30 meters. Of most importance to this study is the Cape urchin (Parechinus angulosus) which is abundant on rocky shores in the Cape, with a mature size of 60 millimeter (Branch, 1994:198). Present regulation allows individuals to remove 20 urchins per day. There are no provisions for companies or commercial fisherman.

3.2 Importance of quality

Emphasis is placed on quality in the Japanese market. Quality relates to a very specific set of criteria - freshness, correct colour, weight and product preparation. The industry did not get off the ground in the USA until Japanese representatives came across to explain what was required in order to satisfy their market. Even now, many of the processors employ Japanese specialists to supervise production (Baxter, 1994:tel interview).

The best quality roe is reserved for the fresh product, which fetches the highest prices. Secondary products are made from broken roe or roe that is off-colour, too large, or leaking excessive fluids. Salted roe is usually produced when the price of fresh roe is low in Japan, July to August and it pays producers to rather add the additional work for a product that will last longer than fresh roe.
The Japanese are said to "eat with their eyes" and that is why the packaging process is critical for success. In Japan as well as in the United States, most roe is bought by "sushi" shops, which are Japanese seafood restaurants specialising in fresh seafood. Customers in sushi shops usually sit at a counter in front of refrigerated showcases, which contain many seafoods, mostly raw, in plain view. Sea urchin roe is displayed in the same wooden trays as used by the processors. To maintain good appearance, broken pieces of roe are placed at the bottom and only whole, firm roe is placed on the top layers of wooden trays. The preferred size is 40 - 50 mm (Price R., 1996:10). Skeins of roe are separated according to their colour. Roe colour ranges from bright yellow to orange to grey, but light yellows are considered the highest grade followed by light orange. Different parts of the market in Japan prefer different shades of yellow. Clear, bright yellow or an orange is best for the fresh market. All dark and discoloured roe is usually discarded. Orange roe is preferred for salting (Kato, 1985:17).

Diagram 3.1: Sea urchin colour and volume chart

The weight of the roe is measured in relation to the weight of the whole urchin. The best weight ratio, or yield, ranges from 10 - 20%, but a premium price is often paid for higher yields. Generally, 10% is the minimum acceptable, although, in recent years, as demand has increased, some dealers have accepted urchins with very low yields. (Hayashi, 1994:pers. interview). The quantity of roe contained in the sea urchin is by and large a seasonal phenomenon, as the amount of roe depends in part on the reproductive state of the sea urchin. However, nutritional state is important, and areas devoid of preferred algae produce sea urchins with poor yield or colour.

3.3 The lifecycle of sea urchins

Increase in gonad size is actually related to feeding, rather than to some intrinsic reproductive cycle, and to storage of glycogen (a carbohydrate) in the gonads. The reproductive events of sea urchins follow a more or less annual cycle, but there are significant variations in the pattern. The yield of roe is greatest just before spawning when it may reach 20 percent of the total body weight. However, during the peak of reproductive activity, uptake of water by the gonads causes them to exude a great deal of gonadal material and the roe has low marketability. After spawning, the gonads are small and the yield is too low for economic use, being 50 percent or less of the peak yield (Kato, 1985:5). Thus, the best quality roe is found just before the onset of proliferation of sex cells and before the gonads absorb water.

The maximum gonad size attained differs not only from locality to locality, but also year to year at the same locality. The causes of this variability have yet to be determined, but according to several sea urchin divers, differences in food supply may be most important (Bernard, 1977:606).
3.4 Development, growth, food and feeding

The sexes are separate in sea urchins and reproduction is accomplished by shedding eggs and sperm in the water. At peak ripeness the gonads leak sex products into the water. Apparently local clumps of sea urchins tend to spawn at the same time in a synchronised group-spawning event (Sloan, 1986:2).

The fertilised eggs develop into planktonic larvae before settling on the bottom where they change into tiny juvenile sea urchins. This recruitment appears to occur annually (Campbell, 1991:192).

New recruits must hide from potential predators and many seek shelter under the spines of adult sea urchins and in rock crevices. Urchins grow in diameter by expanding the plates of the shell. Growth is largely dependent on the amount of environmental stress an urchin encounters, particularly the limitation on quantity and quality of food available. Clark, (1976:42) indicates that urchins reach maturity over three to five years, depending on several environmental factors. Predators include sea stars, crabs, rock lobster, fish and sea otters (Sloan, 1986:2 and Tarr, 1996:1).

Sea urchins feed on many species of algae and kelp. Plankton, as well as organic suspensions produced by sewage outfalls, are also utilised by sea urchins. When food is scarce or absent, sea urchins can derive energy necessary for maintenance by reabsorbing their gonadal and gut tissues (Kato, 1985:7).

3.5 Ecology and management

Grazing by sea urchins has a profound influence on the types of algae that ultimately dominate a particular habitat. This is because sea urchins prefer to eat certain species, thereby leading to the dominance of the less
preferred species (Kato, 1985:7). When released from the regulating effects of predation, urchin populations may expand, leading to denudation of the kelp forests and creation of the so called urchin barrens, covered with crustose caoralline algae (Tarr, 1996:1). Almost without exception, attempts to restore kelp forests have started with the eradication of sea urchins (Kato, 1985:7).

Traditionally fisheries for invertebrates were considered common property. But Campbell, (1991:195) and Kato, (1985:8) indicate that management of the resource is needed to maintain a long-term fishery. Several options exist. Closing the fishery during the spawning season could be difficult to implement as the exact spawning period could vary from year to year. The USA has restricted the number of participants in the urchin fishery industry and combined this with a simple three zone coastal policy, whereby one area is closed to fishing for urchins for the whole year. In Japan seasonal, depth, and diving gear restrictions are all used to help ensure against overfishing, and habitat improvement programs are also employed to encourage settlement and growth of sea urchins (Kato, 1985:8).
3.6 Harvesting and processing

3.6.1 Harvesting
Vessels and diving gear in the sea urchin fishery are similar to those used by the abalone fishery. All harvesting is done by divers using conventional "hookah" gear, that is a low-pressure air compressor connected to a reservoir, which feeds air through a hose to a faceplate. The compressor can usually accommodate up to three divers. Divers wear 6-10 mm thick rubber "wet suits" or thinner "dry suits" to ward off the cold.

Diving operations begin with preliminary searches for concentrations of sea urchins. After finding an area with adequate numbers, the diver cracks open a few sea urchins to inspect the quality of the roe. If satisfactory, harvesting begins.

Most divers have their own methods for collecting sea urchins. One effective method is to use a short-handled rake to dislodge sea urchins and scoop them into a small collecting bag or wire cage. As this is filled, the sea urchins are transferred underwater into a larger mesh bag (Kato, 1985:10).

Divers average between 140 kg per hour to 360 kg per hour depending on the availability of urchins (Campbell, 1991:194).

In port the catch is weighed and loaded directly into waiting trucks, which haul the sea urchins to the processing plants.

3.6.2 The processing facility
Sea urchin processing has not changed appreciably since the 1970's. But because the product is now primarily sold fresh rather than frozen, the packing methods differ and a chemical treatment is used to improve the appearance of the roe. Only a small amount of roe is salted, steamed, baked or frozen.
The following 12 (3.6.2.a – I) pictures were taken by Hayashi in 1994 in an urchin factory in California, USA. Mr. Hayashi is a director for the Humax West Inc Company from Playa Del Ray California. Urchin processing consists of several steps, which readily lend themselves to an assembly line operation. These photographs show the step by step the process that the sea urchins undergo before they are exported to Japan.

**Picture 3.6.2a: Urchin containers**

These plastic containers are direct from the urchin fishing boats. The baskets usually hang on the side of the vessel, thus supplying the urchin with fresh saltwater and reducing the time from harvesting to the Tokyo market.

Sea urchins are usually delivered early in the morning or at night. During warm weather urchins must be stored in refrigerated rooms. Urchins that have been kept at 2°C can stay alive for up to 2 days (Kato & Schroeter, 1985:12).

As can be seen from this close-up photograph, the urchins are packed loosely together. Care is taken so as not to crack the shell. The examples in this picture are of the Red Sea Urchin, (Stronylocentrotus franciscanus) which is harvested mostly in California, USA.
Picture 3.6.2d: Urchins on sorting table

Here the urchins are emptied onto a sorting table. The test (shell) is split with a cleaver or special tool. This process is mechanised in some factories.


Picture 6e: Opening urchins

The instrument's tip is forcibly inserted into the top of the shell, which is cracked open when the handles are squeezed, forcing the flat blades outward.

Picture 3.6.2f: Removing the roe

The roe is removed with a spoon and placed in plastic strainers. Care must be taken so as not to puncture the delicate membrane that surrounds the gonads, as this will lead to smaller, broken pieces of roe, which fetch lower prices.


Picture 3.6.2g: Cleaning the roe

The plastic strainers are then washed in cold saltwater to remove viscera and extraneous matter. Final cleaning of attached membranes is done with tweezers or small forks.

From this point, processing methods depend on the type of product. The Japanese name is given for each of the products described here:


Fresh roe (uni or mama uni).
1. The fresh roe is placed in stackable plastic strainers
2. The strainers are placed in cold saltwater containing a solution of anhydrous potassium alum ($\text{KAl(SO}_4\text{)}_2$) until the roe becomes firm. Concentrations used vary from 0.4 to 0.7 percent, and soak times vary from 15 minutes to 1 (one) hour.

The roe is then drained and packed in small wooden trays. At least 250 g to 280 g of roe are packed in a standard tray. Alternately, the drained roe is bulk-packed in larger, perforated foam trays. These are sometimes lined with absorbent cloth to prevent sliding and damaging of roe in transit. Only one layer of roe is packed in a tray. These trays normally hold about one kilogram of roe.


The bulk pack foam trays are stacked and placed in insulated master cartons with about 8 – 9 trays in each carton. These are placed in a plastic bag and the roe is allowed to drain further in a refrigerator.

Picture 3.6.2I: Shipping of roe

It is important that the roe is not exposed to drafts while draining. Artificial coolant commonly known as "jelly ice" is added prior to shipment (about 1.4kg per carton in winter and twice as much in the summer).


3.6.2.3 Other processing methods are:

Salted roe (shio uni):
Methods of salting vary, depending on the requirements of buyers. Generally, the steps are as follows.
1. Layers of cheesecloth are placed on a wire rack.
2. A layer of roe is placed on the cheesecloth and covered thoroughly with salt. An approximate 25 percent salt to weight ratio is used.
3. More layers of roe and salt are placed on the rack, sometimes with cheesecloth between layers, until the thickness reaches about 5cm.
4. The roe is allowed to drain for several hours overnight. About 40 – 50 percent moisture is removed and salt uptake is about 10 – 15%.
5. The salted roe is packed in plastic lined wooden kegs or plastic containers, sometimes with the addition of 10% by weight of ethyl alcohol (95 percent). This method is used on a limited scale and usually with only good quality roe.

Steamed roe (mushi uni):
1. Fresh roe is placed in wood or screen containers of various sizes.
2. The containers are stacked and placed in a large steamer.
3. The roe is steamed for about 30 minutes and about 20 – 30% of moisture is removed during the process. Some processors steam roe under pressure, reducing cooking time to 15 minutes or less.

4. The roe is bulk-packed or packed in small wooden or plastic trays, and frozen.

**Baked roe (yaki uni):**

1. Fresh roe is placed in shallow ovenproof dishes.

2. The roe is baked in an oven at 190°C for 30 minutes and about 30-40 percent of moisture is removed in the process.

3. The cooked roe is then packed in small wooden trays (around 30g) or in plastic imitation “scallop shells” and frozen.

**Frozen roe (reito uni)**

1. Fresh roe of good quality is packed in standard wood trays or bulk plastic trays.

2. The trays are stacked and inserted in a plastic bag, then frozen at –17°C.

3. The frozen roe, still in plastic bags, is stored in insulated master cartons in the freezer.

   This method is used when the product is to be sold later as raw-thawed sea urchin roe, and only good roe is acceptable. If the roe is destined to be salted or processed further, second grade roe may be used, and it is often simply placed in plastic bags and frozen in bulk.
3.7 Summary

The best quality fresh roe is reserved for the fresh produce market, which brings the highest prices. These additional processing methods are time consuming and very specialised with a much smaller. Few other uses for sea urchin roe have been found although it can be used as feed for sea aquarium animals, particularly for sea anemones and other invertebrates.

Key issues in the sea urchin industry were identified in this chapter. The importance of quality roe measured on the colour and the presentation was emphasised. The colour and size of the urchin roe depends to a large extent on the quality of the food intake and when in its lifecycle it was harvested. The process was investigated right through from harvesting to preparation of final products in the factory. Although secretive, the process is labour intensive and not too complicated. Various alternative processing recipes were listed. The conclusion is that the harvesting and processing of product is possible within the South African market.
CHAPTER 4. VENTURE CRITERIA CHECKLIST

4.1 Industry and market - the USA & Japan

The history of the fishery in America started formally in the sixties when a few individuals harvested small numbers of urchin for home consumption. With the increasing number of Japanese restaurants opening in the United States to serve the growing Japanese business communities, the demand for exotic fish products increased (Sonu, 1996:5).

In 1968 the NMFS Southwest Fisheries Center (USA) started looking into the feasibility of developing a sea urchin fishery to supply a growing domestic market as well as for export to Japan. The decision to initiate a fishery was prompted not only by the demand for the product, but also because kelp harvesters, recreational fisherman and the abalone industry considered sea urchins pests. Quicklime (calcium oxide) was sometimes used to clean commercial kelp beds. Other advantages of the urchin industry included reduction in fishing pressure on abalone and other invertebrates. In 1972 the first Californian sea urchin processing plant was opened (Sonu, 1996:7).

In the years 1987 to 1993 the sea urchin industry in the USA has grown from nothing to a $40 million dollar business (See figure 4.1). Prior to 1987 the quantities harvested were extremely small. (Records date back to 1933).
Urchin roe is a delicacy in Europe, Japan, and in some of the ethnic markets in northeastern United States, but it is the Japanese market that has provided the stimulus to the rapid development of this fishery in the USA (Creaser, 1994). “Uni sushi”, (which is the orange-yellow reproductive tissue from the sea urchins), is sold fresh at premium prices at Tokyo’s fish market auctions. Harvests locally in Japan cannot supply the demand, so the Japanese import roe from all over the world. In 1994 Japan imported 6130 metric tons of sea urchins and sea urchin roe valued at $251 million (in excess of R1.25 billion). The USA alone contributed more than $155 million of this amount during that year (Sonu, 1996:4).

It is thus evident that the sea urchin roe market is growing and that it is relatively large. There is no company operating in the South African market. These are all positive indicators for a potential business venture.
4.2 Economics

4.2.1 Calculations

The following assumptions were made upon the calculations were based. Favourable weather conditions and an average yield of 6.5 percent (the yield was expected at around 8% but due to inexperience and unskilled labour the expected yield was reduced to 6.5%). This was based on wet weight. The harvesting period was for 9 (nine) months a year with a monthly production of 25 tons gross weight. The calculations were:

Monthly tonnage harvested of 25 tons with a 6.5% yield gives 1 625 kg sea urchin roe only. Eight percent of this roe could be graded as top quality, approximately 125 kg. Average yen price per second grade quality roe = 1000 yen per 300 grams (around US$28 per kg). Top quality roe was fetching up to 16000 yen at the time with an exchange rate of 120 yen to 1 US$, but averaging around 12 000 yen per kg.

Gross income would then be 1500 kg x US$ 28 = $42 000 per month for the average roe. The 125 kg top quality roe would have brought in another 12 000 yen per kg or US$100 per kg for a total of US$12 500 per month.

Total income for the roe per month would equal US$54 500. The exchange rate between the US$ and rand is taken as R6.20 to the US dollar. At an average exchange rate of R6.20 to the US $ the monthly gross income would have been around R337 900.
Diagram 4.Draft monthly income statement

| MONTHLY INCOME | R337 900.00 |
| TOTAL EXPENSES | R250 000.00 |
| Rental of factory | R15 000.00 |
| Electricity & Water | R 8 000.00 |
| Purchasing of urchins from Divers at R1.00 per kg | R25 000.00 |
| Processing costs of R1.20 per kg | R30 000.00 |
| Trucking Costs | R18 000.00 |
| Airfreight costs & duties per kilogram / m² | R69 000.00 |
| General Expenses | R 5 000.00 |
| Salaries | R25 000.00 |
| Licensing Fees | R 6 000.00 |
| Brokerage / Agent fees(*) | R49 000.00 |

TOTAL PROFIT /LOSS BEFORE TAX R87 900
TAX @ 30% R26 370
AFTER TAX PROFIT R61 530

Gross margins averaged around 176%, exceeding the minimum acceptable level of 50%. This provided the venture with an after tax profit of 18.2%.

A capital and working capital investment was calculated at R800 000. After tax profits would have provided the firm with a return of R553 770 (for a 9-month period) which yields a ROI of 69%. This is far above the acceptable norm of 25%.

Economically the sea urchin venture fulfilled all the economic criteria as put forward by Timmons as quoted in chapter 2.
4.3 Value added issues

The sea urchin harvesting venture in South Africa has the potential to add value to the raw product. Various options existed as discussed under the different processing methods. Semi-skilled labour is also available in the region due to the downscaling of several of large fishing companies (Marais, 1997:11).

Exiting the business is inexpensive and easy. The Sea Fisheries concerns did not relate to the relocation of any organisms (Tarr, 1995: interview). The venture would not have impacted the surrounding nature in a permanent way (Dewees, 1992:36). Workers were paid on production for a nine-month harvesting period.

From a value added or harvest point of view the business is attractive.

4.4 Competitive advantage issues

The traditional advantage issues as outlined in the previous chapter do not all apply in this situation as there is no competitor in the South African market.

The Japanese suppliers largely dominate the sea urchin roe market. The USA is the largest exporter of sea urchin roe to Japan (approximately 60% of their imported roe) (Sonu, 1996:4). South Africa’s production would only form 3.5% of Japan’s total imports. The new venture will thus not have much control over prices or distribution, which is similar to what can
be expected of an international commodity. The advantage is that the pricing is transparent and determined on the open market (Figure 3b). Specialist brokers would be handling the importation of the roe into Japan and would facilitate the transport. The fee is accounted for in the income statement, refer point (*) diagram 3b.

The entry barrier into the South African urchin market could be a major advantage for the proposed venture. The Department of Sea Fisheries controls the licensing. The Department realised the importance of sea urchins and the possible contribution that it could make to the Western Cape region. The Department of Sea Fisheries thus granted an exclusive experimental license to the writer in September 1994 to harvest sea urchins north of Cape Colombine, for a one-year period. It was indicated that this license could be extended for an exclusive period of possibly five years and the tonnage increased, if the venture looked commercially viable. This would have shut the door for any other potential competitor in the South African market and provided the new venture with a window period in which it could establish itself and recuperate the investment sunk in developing the market.

Although the South African venture would not have been a world leader the difficult entry barriers ensured that it would have a minimum of five years of no competition.
4.5 Management team issues

The team that was formed to run the venture included a professional diver, Conrad Vlok, who had previous experience in running diving operations in Mozambique. Mr. Hayashi represented the Japanese buyers’ consortium and would have been responsible for the transport and distribution in Japan. Mr. Lum was the legal representative for the Chinese American Food Buyers’ Association who was willing to ensure that the necessary equipment and expertise was made available to the South African operation to ensure quality acceptance in Japan. The writer is a commerce graduate and was also the holder of the South African license with the overall responsibility for the management of the South African operation.

Between these four individuals were the major components for a strong entrepreneurial team with the necessary industry and technical experience required.

4.6 Personal criteria

The writer’s personal goal was to return to Cape Town as he was presently employed in Gauteng. The sea urchin venture would bring him in close proximity to Cape Town, still being employed in his field of study, commerce, but with greater financial independence. Opportunity costs incurred were not a major concern as the opportunity was seen as a major step towards developing the necessary skills to manage and run his own business.
4.7 Strategic fit

The team that was formed had the necessary experience, drive and the ability to pursue the opportunity. The timing was right as the international markets were only now opening up for South Africans after the 1994 elections. Postponing the venture would leave the door open for other companies to obtain the exclusive license. Pricing was done on the open market according to the industry standard and a member of the team with previous experience took care of distribution. The 176% gross margin provided the venture with room for error and was seen as one of the major attractions of the venture.

4.8 Fatal flaws

4.8.1 Sea Fisheries license

The Department of Sea Fisheries granted an exclusive experimental license to the writer in September 1994, to harvest sea urchins north of Cape Colombine, for a one-year period. The permit was subject to the following main conditions:

1. That harvesting could only be done by the diving method and below the low water mark. All such activities were to be conducted in such a manner that disturbance to other marine biota was kept to a minimum.

2. The permit allowed the holder to harvest a maximum of 10 tons of Cape sea urchins per month during this period.
3. A progress report on the feasibility of the project and problems experienced was to be submitted to the Chief Director: Sea Fisheries by 31 August 1995.

4. Monthly data statistics had to be submitted to the Sea Fisheries Research Institute.

International urchin roe dealers visited South on the invitation of the writer Africa (Lum & Hayashi, 1994). It was found (at the time) that the urchins and urchin roe yield from the experimental site was not sufficient to warrant commercial activities. The area east of Cape Point did have urchins of the right size with an acceptable roe to urchin weight ratio. However this fell within the abalone catchment area.

As abalone seeks protection from predators among the spines of the urchin, the argument prevails that removal of large numbers of urchin might lead to a higher juvenile mortality rate for abalone. The Department of Sea Fisheries was reluctant to grant even an experimental license in this area as it might affect the lucrative abalone industry, according to Tarr, (1994/5: pers. interview)) and Laan, (1994: pers. interview).
4.8.2 The physical data

During September and October 1994, several surveys were done within the given permit area, as well as to the area south of Hout Bay. The following statistical data was taken from the catchment area (the permit area, North of Cape Colombine). The results were as follows:

The average size of the sea urchins varied from 25mm to 45mm, with an average of 37 mm (total of 50 urchins were taken in the sample). The average yield was less than 5% of the “wet” weight. (Wet weight is the total weight of the sea urchin ± one-hour after removal from the ocean). The colour was poor and varied between pictures 112 and 116 (see figure...
3c). A large percentage (12%) of the urchins was empty indicating that they were too old to generate gonads. Distribution between 3 and 10 meters were less than 3 urchins p/m².

At closer inspection the American experts indicated that the sea urchins showed symptoms of food scarcity. The large number of sandy areas between small kelp beds made feeding and breeding difficult for the sea urchins. The “red tide” that existed around this part of the coast 2 months prior to the study could also explain the small gonads that were present. Large crayfish, a natural enemy of the sea urchin was also scarce. This could explain the number of old sea urchins.

4.8.2.1 Further samples

Two further samples were taken east of the Hout Bay area. In the second sample (an area that was not included in the license) the results were very promising. The average yield in the first sample yielded 11% and the second sample 13% yield on the wet weight. Average size varied between 35mm and 55mm. The colour was acceptable for 2nd or 3rd degree quality (pictures 108 — 110 & 122 - 123). The gonad on removal was extremely soft and a lot smaller than those of the American Red Sea Urchin. The distribution of the urchins was also dense, with more than 55 sea urchins per square meter in some areas. This is higher than the required 15 - 20 individuals per m² that is required for a viable commercial site.

Tarr, (1996:9) indicated that areas such as Danger Point averaged between 45 and 75 urchins per 0.25m² between 1989 and 1996. Mudge point and Betty’s Bay averaged between 45 and 65 individuals per 0.25m² between 1989 and 1994.
4.8.3 The Sea Fisheries concerns

These results were presented to the Sea Fisheries' officials to ask for a possible extension of the existing permit into the areas that had a yield of above 10%. As mentioned the Sea Fisheries authorities were reluctant to extend the urchin license further east of Cape Point. The reason was their primary concern regarding the absence of any research on the effect that the removal of large numbers of urchin will have on the rest of the ecosystem (Tarr & Laan, 1994/1995:pers interview).

In particular the effect this will have on:

1. **Abalone**, as it seeks protection from predators among the spines from the urchin. The argument prevails that removal of large numbers of
urchin might lead to a higher juvenile mortality rate. At present the abalone industry is worth R56 million.

2. **Kelp**, which acts as feed for the sea urchin and as protector for several species of fish mollusks. The Kelp collection industry is worth R4.2 million annually (refer picture 1).

3. **Crayfish**, as the sea urchin forms part of their diet. This industry is worth over R187 million a year.

4. The **degree of involvement** from the local communities in the whole process as they will have a historical right to the product.

5. The **possible backlash** effect that the granting of a sea urchin license may have once the information had to become public.

Research on the relationship between abalone, urchin and kelp has been done in the USA by Dewees, (1992), Wilson(1983) and Tegner, (1980 & 1982). These studies indicated that sea urchins are known to affect the distribution and well being of both groups. Abalone seems to outcompete sea urchins for space, although sea urchins may be more effective in feeding. Competition for food is likely to occur. Selective fishing for abalone, both in Australia and California, may have contributed to increases in numbers of urchins (Kato & Schroeter, 1985: 4 & Shephard, 1973). Abalone recruitment and settling is usually lower in areas with low urchin density and additional urchin harvesting pressures will, according to Tarr, (1996:2), negatively affect the abalone industry.

Studies of the effects of experimental harvesting of **kelp** (for abalone-feed) at Danger Point have shown that although the understorey (settlement of sea plants underneath kelp) community has so far been largely unaffected by harvesting, regrowth of the kelp canopy has been poor. It is thought that kelp recruitment is being severely limited by herbivores and in particular, sea urchins (Bernstein et al, 1983:1978).
In California attempts to restore kelp forests started with the eradication of sea urchins, and successful results of some of these efforts seem to demonstrate that sea urchin grazing is a principal reason for failure of kelp to become re-established in certain habitats.

From the point of view of those favouring kelp propagation, it is clear that reduction in numbers of urchins may be beneficial.

Tarr, (1996:2) suggests that a large scale invasion of the kelp beds and inshore area, by rock lobster in the areas east of Hangklip has virtually removed the entire sea urchin population previously present. Rock lobsters and the subsequent removal of sea urchins have detrimental implications for the sustainability of abalone harvests in future years. Thus commercial harvesting of sea urchins will only assist this already negative trend.

The social & economic involvement of the local communities in the commercial explanation was set out in the initial license application. The harvesting and processing of sea urchins is highly labour intensive (Kato, 1985:16).

Care would be taken in the harvesting procedure not to be commercially active close to popular recreational areas so as not to antagonise sensitive members of the public. Sea urchin waste is made up of approximately 33% water,

The request for additional areas by the parties concerned was turned down, although Sea Fisheries were inclined to extend the area to West of Cape Point. However these areas did not provide the necessary yield that was required.
Not obtaining the necessary rights to the preferred areas constituted a fatal flaw in the proposed venture. A definite business opportunity existed for echinoderms but to make it commercially viable additional harvesting areas had to be obtained which put existing industries in danger.
4.9 Final conclusions

A set of criteria was arrived at that was suitable for the evaluation and assessment of the business opportunity for echinoderms. This set of criteria included aspects such as the specific industry and market, as well as the relative profitability and fatal-flaw issues pertaining to this industry.

The key issues such as quality and grading, processing and harvesting and also the environmental aspects of the urchin i.e. feeding and lifecycle were explored. An understanding of the market with specific reference to potential viability of harvesting and processing of sea urchins was developed.

The final conclusion was that it was evident that sea urchin’s roe is a fast growing industry that offers entrepreneurs a good opportunity. It was also established that there is potential commercially viable business opportunity to develop sea urchins as an export product for the East. The potential industry also has a fatal flaw that prevents entrepreneurs from exploiting the opportunity. Sea urchins are necessary for the protection of juvenile abalone and abalone is an established industry in South Africa. By removing large quantities of urchins the abalone industry would be jeopardised and thus permission to harvest the viable areas were denied. The possibility of these areas opening up for future urchin harvesting is improbable and will only be considered if it can be shown that harvesting urchins will not to disturb the environment, and especially juvenile abalone. Possible ways to harvest or culture sea urchins could be an area for future research.

It is hoped that this study shed light on possible new business opportunities that are opening to South Africa since the country’s reintroduction to the world market. An ever-increasing local and global
population will place more and more pressure on our limited natural resources. The democratisation and opening up of previously closed industries creates opportunities for viable entrepreneurial businesses, if its contribution to the country's economy and its people can be shown.
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