

**AN INTEGRATED ECONOMIC DEVELOPMENTAL APPRAISAL
OF THE SOUTH AFRICAN MARICULTURE INDUSTRY**

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ABSTRACT

Current coastal legislative and institutional reformulation has effectively established new principles for the promotion of sustainable, co-ordinated integrated coastal development to be achieved through facilitatory, co-operative management mechanisms. In accordance, collaborative expansion and diversification of mariculture has been identified as a strategic mechanism for realising sustainable coastal development. Present limited foundational understanding regarding the emergent commercial contingent's economic-institutional structure has constrained the effectiveness of current centralised broad objective formulation based planning techniques. By drawing upon findings of the 2001 National Mariculture Baseline survey, key economic development and institutional components requiring dedicated attention for further realising industry's inherent growth potential to supply domestic and growing global aquaculture markets are examined in an inductive explorative framework. Attention is also directed towards promoting realisation of collaborative mariculture development initiatives to redress dualistic development disparities in previously marginalised coastal localities. Finally, synthesis between traditional bureaucratic centralised co-ordinated planning and regionalised decentralised implementation orientated capacity building frameworks displaying a greater relevant stakeholder participatory ethos are examined.

INTRODUCTION

Recent coastal legislative reformulation, realised as the Marine Living Resources Act [MLRA of 1998] has been accompanied by organisational restructuring leading to the creation of Marine and Coastal Management [MCM]. MCM is the official government department designated by Department of Environmental Affairs and Tourism [DEAT] as responsible for promoting domestic mariculture industry growth and fishery management. This has contributed to provision of a facilitatory enabling environment for promoting sustainable coastal development in South Africa. Motivated by perceived current over-capitalisation within the domestic natural capture fishery, mariculture has been identified as a plausible mechanism for achieving sustainable coastal development where mariculture activities afford a realistic complement to strategically limited natural capture fishery expansion. This is complemented by increasing recognition that the South African industry displays further inherent export growth potential to supply expanding global aquaculture markets with quality high-value differentiated produce. Finally, establishment of collaborative partnership arrangements between government, the private-sector commercial mariculture contingent and identified beneficiaries simultaneously provides a dynamic opportunity for addressing dualistic development disparities within previously marginalised coastal localities.

Legislative and organisational reformulation has provided an important legal-institutional foundation for coastal development. However, current absence of a clear integrated understanding regarding the basic economic-institutional composition of the domestic mariculture industry has effectively limited the capacity of present planning approaches to facilitate future development. By drawing upon interim findings of the 2001 National Mariculture Baseline survey, the discourse provides an economic development orientated approach directed towards realising industry's inherent growth potential, consistent with broad coastal legislative guiding principles. In accordance, the work seeks to enhance the existing knowledge base and open further investigative enquiry, promoting formulation of an appropriate holistic multi-faceted mariculture development framework.

In an attempt to achieve this, the discourse is presented in three components. Part 1 provides a general framework of the South African mariculture industry, detailing historical and contemporary contextualisation. This is supplemented by theoretical foundations firmly grounding perspectives progressively developed throughout the remaining discourse. Part 2 adopts a selectively reductionist approach by identifying key integrated economic development and institutional variables requiring synthesis within an integrated planning framework. Finally, Part 3 amalgamates the presented conceptualisations and perspectives, providing recommendations for future integrated mariculture development and planning in South Africa.

PART 1: Framework of the South African Mariculture Industry

The following component seeks to provide a firm historical and contemporary contextualisation regarding the status of the domestic mariculture industry. In accordance, the section is divided into three chapters. Chapter 1 provides a coherent and concise operating definition of mariculture, reflecting current activities of operational firms. The opportunity is taken to clarify the meaning of frequently used terms of formal private sector firms and envisioned informal socio-economic orientated mariculture development initiatives. A brief historical synopsis tracking mariculture industry development is provided, demonstrating the relatively emergent nature of commercial activity. This is supplemented by a detailed accord of current institutional and legislative reformulation that establishes a revised legal-institutional framework for integrated sustainable coastal development. Finally, an overview briefly outlining the current status of mariculture planning is provided.

Chapter 2 presents a firm theoretical foundation for the construction of perspectives presented in the remaining chapters. An inductive explorative approach is adopted that seeks to open investigative inquiry beyond that permitted by confined narrow traditional doctrinal purity. As such, a selection of pertinent theoretical aspects are drawn from the areas of development economics, micro-economics, new institutional economics and planning. Synthesis of variables from these fields provides holistic integrated insight into relevant issues requiring dedicated attention if the inherent growth potential of the domestic mariculture industry is to be realised. Conceptual introduction is commenced with a brief accord of traditional economic development frameworks, before specific reference is made to dualism. New institutional economics is briefly presented, enabling appropriate consideration of the vital role institutional mechanisms occupy in facilitating development, further contributing to holistic treatment of the domestic mariculture industry.

Chapter 3 presents a descriptive micro-economic analysis demonstrating the contemporary status of the domestic mariculture industry based on data generated during the interim 2001 National Mariculture Baseline Survey. This formulates a sound factual basis for perspectives presented in Parts 2 and 3. A brief accord of research design is provided. The research involved administration of comprehensive standardised survey-orientated questionnaire schedules that afforded latitude for respondents' qualitative telemetry. This is enabled important insights regarding the economic structural composition of the industry, and participants' perceptions and concerns relating to future industry development to be collated. Economic structure is delineated into categories describing firm structure, geographical distribution of operations, production data and industry's current labour profile. This is supplemented by thematic presentation of industry's general perceptions regarding future establishment of envisioned collaborative partnership orientated socio-economic mariculture satellite initiatives, and future MCM roles to promote industry development.

CHAPTER 1: MARICULTURE INDUSTRY CONTEXTUALISATION

1.1 Introduction

The contemporary South African mariculture contingent has “become firmly established as a small but dynamic industry” (Hecht & Britz, 1990_a: 1) exhibiting inherent potential to become structurally transformed into high growth activities. Furthermore, the opportunity exists for simultaneously providing feasible realisation of envisioned socio-economic development within previously marginalised coastal localities. The emergent nature and rapidly growing importance of the local mariculture industry is largely attributed to legislative policy reformulation and the crisis surrounding perceived over-capitalisation within the domestic fishery. This has been exacerbated by environmental concerns over natural living marine stock depletion, strictly limiting opportunities for further natural capture fishery expansion. Indeed, depletion of natural living marine stock where “levels of harvest in the traditional fishery are near maximum, and many species [particularly line fish] are over-exploited” (Department of Arts, Science, Culture & Technology, 1999: 14) has generated an urgent need for the creation and implementation of sustainable alternatives. As a result, mariculture has become clearly identified “as a [sector] requiring special attention with regard to promoting expansion and diversification activities” (MCM, 1999_a: 1)¹.

At present, a limited foundational understanding regarding the contemporary economic-institutional relations of the industry exists. In accordance, the discourse seeks to actively open processes of investigative inquiry rather than close it by conforming to narrowly based traditional doctrinal purity. As such, selective extrapolation of pertinent theoretical aspects from development economics, new institutional economics, micro-economics and planning are synthesised to provide holistic integrated insight into relevant operational issues requiring dedicated attention if the inherent development potential of the domestic mariculture industry is to be realised. In accordance with decentralised planning frameworks, the ethos of a Local Economic Development [LED] perspective is adopted. The approach demonstrates a paradigmatic shift away from deterministic orientations of human progress towards post-modernistic thought reflecting individualism, uniqueness and local autonomy (Nel, 1999:5). Inter-disciplinary theoretical doctrine is integrated with a descriptive micro-economic analysis developed from interim results generated during the 2001 National Mariculture Baseline survey (Hepburn et al., 2001). Aside from micro-economic analysis being the most common form of analysis in aquaculture where the unit of analysis is the individual firm (Charles, 1997:6), the approach is used to protect valuable insight provided by individual firms from becoming distorted through unnecessary aggregation. Analytical results are then utilised to direct systematic treatment of development economic variables, protecting perspectives progressively

¹ Material sourced from Marine and Coastal Management is referenced MCM within the discourse. Although MCM is a department within the Department of Environmental Affairs and Tourism of the South African Government, available literature concerning the emergent domestic mariculture industry is considered ‘grey’ material. Consequently, material is not directly referenced to DEAT.

developed through the discourse from becoming unguided, incohesive, baseless directives. However, before proceeding further a feasible, coherent and concise operating definition reflecting the nature of formal private sector mariculture production activities characteristic of current operations is generated. Attention is also directed at establishing clarity regarding the conveyed meaning of terms frequently utilised throughout the remainder of the discourse. Furthermore, in an attempt to provide holistic industry contextualisation, a brief overview of previous developments, relevant legislation reformulation, organisational restructuring and current planning are presented.

1.2 Terminology

1.2.1 Mariculture defined

Nash (1995_a:6) notes that “there is no definition of aquaculture which is accepted universally as there are many forms of human interventions possible in the production of aquatic animals and plants”. As such, aquaculture may be broadly defined where the term refers to “the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production ... [as well as] ... individual or corporate ownership of the stock being cultivated” (FAO, 1998_a: iv). Similar difficulty exists with regard to specific definition of mariculture, a form of aquaculture differentiated by production of marine water bound organisms that geographically limits activity to coastal localities. Technocratic fragmentation emanating from mariculture’s diverse production derivatives, including culture-based fisheries², necessitates adoption of a revisionist perspective where mariculture is regarded as “cultivation of the end product in seawater even though earlier stages in the life cycle of the concerned aquatic organisms may be cultured in brackish water or freshwater” (Roberts, 1995:2). Based upon thematic integration of essential production characteristics and for purposes of the discourse, mariculture thus incorporates the raising of marine finfish, shellfish or aquatic plants under controlled environmental conditions varying in intensity, to enhance both quality and quantity of production beyond that of natural processes, where production is designated for general human consumption³.

Of future important functional use are technocratically orientated production classification systems of mariculture activities based on criteria pertaining to the purpose of culture and level of management intensity. In accordance, Stomal & Weigel (2001: 2) consequently identify three main types of production systems synonymous with aquaculture [and mariculture] activities typical of

² More specifically, activities aimed at supplementing or sustaining the recruitment of one or more aquatic species and raising production ... of a fishery beyond a level which is sustainable through natural processes ... [using] enhancement measures [such as] stocking natural water bodies, fertilization ... [and] environmental engineering including habitat improvements” (FAO, 1997_b: 1).

³ It is important to note that reference to human consumption of final cultivated product has been utilised to describe the ultimate aim of produce cultivated by domestic South African mariculture operations. However, as Nash (1995_a: 6) elucidates “ ... production does not necessarily result in products for human consumption, but commodities for any practical or aesthetic use”.

Africa and the Middle East. Firstly, the subsistence system characteristic of rural production where cultivation practices assume the purpose of meeting basic nutritional needs, and are associated with culture where neither feed nor fertilizers are actively employed (Stomal & Weigel, 2001: 2). Furthermore, stocking densities closely resemble natural levels (O'Sullivan & Purser, 1993: 2). Secondly, the small-scale commercial system analogous with semi-intensive culture where additional nutritional supplements [whether feed or fertilizers] are utilised to ensure that the primary objective of marketing surplus produce is met. The system is generally perceived as a peripheral activity structured around core agricultural or live-stock rearing practices, seeking to maximise available by-product use from crop or husbandry farming [e.g. organic compost/manure] (Stomal & Weigel, 2001: 3). Finally, commercial or industrial production systems characterised by extensive financial capital outlay involving large scale production output bound for domestic or export markets where activities are dedicated to maximising returns on investment (Stomal & Weigel, 2001: 3). High stocking densities are attainable due to rigid control of environmental variables producing ideal habitual conditions for the cultivated species (O'Sullivan & Purser, 1993: 2).

1.2.2 Frequently used terms

It should be duly noted that references to the formal domestic mariculture contingent designates the majority of contemporary industry where firms use commercial or industrial production systems. The firm's characteristics are thus consistent with the attributes of commercial production systems as discussed in the previous paragraph. References made to the informal contingent designates envisioned public-private collaborative socio-economic orientated mariculture development initiatives seeking to facilitate economic development within previously marginalised coastal localities. It needs to be made clear that the socio-economic contingent does not refer to proposed establishment of subsistence mariculture systems in South Africa, which have been disregarded by MCM as infeasible (MCM, 1999_c:94-95). Rather, the term designates initiatives utilising strategic Community-Public-Private [CPP] partnerships and context-specific appropriate technologies, based on notions of "mariculture as a unique opportunity for community benefaction" (MCM, 1999_c:122). Although subsistence fishers may be candidates for such initiatives, the approach is neither geographically limited to a specific provincial coastal locality nor occupationally biased. It is thus directed at promoting socio-economic development in any marginalised or previously disadvantaged coastal community that has identified inherent mariculture development potential which can be feasibly attained through formation of strategic partnerships.

Such notions are consistent with the White Paper on Sustainable Coastal Development of 1999 and Marine Living Resources Act of 1998 [MLRA]. These documents recognise the potentially vital role sustainable coastal resource utilisation can assume regarding future upliftment in under-developed regions along the domestic coastline. Indeed, provision exists for establishment of local

demonstration projects seeking to attract investment funders. Such projects seek to “provide tangible examples of [how successful] integrated coastal management ... [can in the medium-term] contribute to job creation, poverty alleviation and development along the coast” (White Paper, 1999: 118)⁴.

As a momentary point of departure, it is important to note that the domestic mariculture and seaweed industries are becoming inextricably tied on a number of accounts. At present, the seaweed industry is generally associated with primary-product extraction based on beach-cast gathering or sustainable resource harvesting. Due to the absence of a domestic commercial processing plant, “the majority of beach-cast seaweed is sun dried, milled and exported for the extraction of agar” (Tronchin & Bolton, 2001: 5). Links between the two industries include institutional managerial amalgamation by Marine and Coastal Management [MCM]; economic production linkages via the sale of sustainably harvested seaweed supplied for abalone feed; and contemporary coastal development paradigms outlined in current legislation which conceptualise the use of appropriate-technology initiatives to catalyse socio-economic development. The seaweed industry has been historically perceived as ideal for realising socio-economic development directed at enhancing welfare of previously marginalised coastal beneficiaries by virtue of low capital requirements associated with gathering and harvesting activities. Propositions regarding achievement of such objectives include Levin's (1996: 33) notion of establishing co-operatives and Freese's (1995: 71) advocacy of ‘cottage industry’ development accompanied by decentralisation and power devolution in a bid to ensure responsible coastal zone management. Furthermore, a reported willingness exists among the majority of current concessionaires to engage in sub-contracting activities (Tronchin & Bolton, 2001:3). However, subject to space constraints and maintenance of strategic focus, attention is focused on the mariculture industry in a bid to avoid superficial treatment of essential seaweed industry specific development issues.

1.3 Contextualisation

1.3.1 Historical perspectives

The primary objective of the discourse is the conduction of a developmentally orientated economic analysis of the domestic mariculture industry accompanied by identification of growth inhibitors to both the formal and informal contingents. However, a brief historical account outlining progress and developments within the industry is provided to illustrate the recently emergent commercial nature of mariculture in South Africa. As the intention is not to induce boredom, painful historical analogies are kept brief and concise.

⁴ Furthermore, chapter 5 section 5.2.5 briefly examines a number of facilitatory supportive organisational structures currently available to promote realisation of collaborative partnership arrangements targeting socio-economic development amongst previously marginalised localities consistent with envisioned mariculture development initiatives.

According to Hecht & Britz (1990_a: 8-13), the origins of successful aquaculture in the form of trout farming have been traced to the 1890s, which saw establishment of a hatchery in Umgeni, KwaZulu-Natal. However, it was not until 1945 that the first trout farm was established in the Magaliesberg, paving the way for commercialisation of the species. In 1948, mariculture operations commenced when the first commercial oyster farm was created in Knysna. Mussel culture is a more recent innovation based on the successful adaptation of Spanish originated rope and raft culture technologies, leading to establishment of the first commercial operation in 1984 (Hecht & Britz, 1990_a: 8-13). Commercial cultivation of high-value abalone in the early 1990s represents a contemporary addition to the domestic mariculture industry. Successful commercialisation is a result of collaborative partnerships between the fishing industry and research institutions, supplemented by “a hybrid of technology transfers from countries with established farming techniques and local innovation” (Britz, 1997_a: 8-9).

Within the global sphere, mariculture and aquaculture is a high growth industry experiencing production increases from nine million tons in 1984 to 19 million tons in 1994, exhibiting an annual growth rate of 10% (Tacon, 1996:6). As such, the increasing importance of aquaculture’s contribution to global food supply has transformed it into one of the world’s fastest growing food production systems (Tacon, 1996:6). In stark contrast to Asia and Europe, Africa contributes a mere 0.4% to global aquaculture production (Dept. Arts, Science, Culture & Technology, 1999: 42). During the period 1986-1995, domestic South African aquaculture production increased by 288% as a direct response to an integrated national aquaculture research programme (MCM, 1999_c: 25). The most important mariculture species currently cultivated in the domestic industry include abalone, oysters and mussels. Although open-ocean mariculture is generally restricted by the paucity of suitable sites, certain harbours, coastal inlets and estuaries provide suitable locations for operating activities (MCM, 1999_c: 27).

During the period 1960-1980, research support for fresh water aquaculture in South Africa was principally provided by provincial conservancies and undertaken at hatcheries under their jurisdiction. Mariculture research and development was supported by the Fisheries Development Corporation [FDC] from 1955-1985 at Knysna, Langebaan, Rhodes University, Port Elizabeth museum and Amatikulu in KwaZulu-Natal (Hecht et al., 1992: 13). Subsequent to the demise of the Fisheries Development Corporation in 1987, the Foundation for Research and Development [FRD]⁵ assumed a pivotal role in sponsoring technological research from 1985-1990 (Bross, 1993: 11). From 1990-1994, aquaculture research and development was exclusively funded by the private sector. Credit should be duly awarded to industry’s perseverance regarding the establishment of a firm marketing base and adaptive innovation of technology. Establishment of

⁵ Currently the National Research Foundation [NRF].

the South African Network for Coastal and Oceanic Research [SANCOR] in 1994 and the subsequent development of a dedicated mariculture programme supported by the FRD, the Department of Environmental Affairs and Tourism [DEAT] and industry has provided significant impetus to contemporary mariculture development (MCM, 1999_c: 31-32). Recent institutional restructuring in response to legislative revision has resulted in the establishment of MCM, which currently assumes official responsibility for promotion of the domestic mariculture industry, supplemented by continuous research conducted at supporting universities.

The strong and co-ordinated dedication exhibited by industry in the promotion of aquaculture is evident by the current existence of three industry-based producer associations: the Aquaculture Association of South Africa [AASA], the Abalone Farmers Association of South Africa [AFASA], and the Mariculture Association of Southern Africa [MASA] (AFASA minutes, 2001: 13). The AASA was “constituted in 1990 as an umbrella organisation promoting the interests of aquaculture ... [and has since] gained governmental recognition as the official interest group representing [industry]” (MCM, 1999_c: 19).

1.3.2 Legislative framework

At present, there is a definitive lack of comprehensive policy providing a specific prescriptive framework for the integrated national development of the South African mariculture industry. In the absence of such policy, Growth Employment and Redistribution macro-economic strategy [GEAR] provides a broad-based general framework for economic growth within all sectors of the domestic economy. Against the background of a successful democratic political transition, macro-economic policy advances by advocating neo-liberal based prescriptions⁶ to achieve economic growth, evident in both fiscal and monetary policy stances⁷. Although GEAR does not articulate sector-specific development frameworks, the attainment of certain national policy goals, including accelerated growth of non-gold exports and a profitable surge in private investment (RSA, 1996_a: 2), relates to expansion of productive activities within the formal commercial mariculture industry.

At present, growth within the domestic mariculture industry has been complemented and guided by recent national institutional reformulation directed through the realisation of new coastal legislative policy represented by the MLRA. The act is firmly based on the guiding principles of the White Paper for Sustainable Coastal Development. This White Paper itself is the product of an extensive

⁶ Where it is presumed at the national level or through regional groupings the state “adopts, improves and enforces appropriate legislation and administrative procedures for the control of restrictive business practices” (Gray, 1991:405).

⁷ Indeed, specific components of GEAR’s integrated medium-term strategy seeking to ensure transformation towards a competitive outward-orientated economy include greater labour market flexibility within collective bargaining systems; budget deficit reduction and tighter monetary policy to constrain inflation and maintain financial stability; tariff reduction and exchange control relaxation, opening the domestic economy to internationally competitive markets; and public sector reformulation involving asset restructuring via privatisation in an attempt to increase capital expenditure efficiency and service delivery (RSA, 1996_a: 2-3).

and integrated process of public participation, research and analysis initiated in May 1997, leading to the development of the discussionary Coastal Policy Green Paper distributed during September 1998. Consistent with national legislative procedures, the Green Paper was accordingly followed by a release of the Draft White Paper for Sustainable Coastal Development in March 1999 through the actions of DEAT.

The emergent White Paper has effectively created a vision for the development of the South African coastline. These include the establishment of principles, goals and objectives for the promotion of sustainable, co-ordinated, integrated coastal development via the adoption of facilitatory, co-operative, holistic, accountable and responsible management (White Paper, 1999: 1-8). Furthermore, the White Paper represents a policy shift in a number of regards by emphasising the full value of the coast. This includes adopting a people-centred approach to sustainable coastal development, effectively replacing the resource-centred approach. The previous approach involved extensive use of command and control policies that attempt to directly regulate resource users via the adoption of legally enforceable rules or standards (Callan & Thomas, 1996: 24). Furthermore, an integrated coastal management system is adopted such that “the ongoing process of planning, decision-making and ‘action on the ground’ [ensures] ... coastal stakeholders work together to promote human development with ecological integrity” (Glavovic, 2000: 16).

The MLRA was implemented in September 1998 and replaced the Sea Fisheries Act of 1988. It should be duly noted that compilation and implementation of the new act occurred in response to three concerns, namely:

- Granting previously excluded communities access to the fishing industry.
- Establishing a deregulating market framework to ensure South Africa's fishing industry is compatible with current global markets. In accordance, fishing rights are based on stringent quotas and the user-pays principle to supplement government revenue and provide funding for monitoring and enforcement.
- Creation of Marine Protected Areas that may be utilised to increase natural stock levels or conduct research (Cape Argus, 1999: 1-4 [supplement]). Coastal and marine protected areas not only “contribute indirectly to the local and national economy by safeguarding future fishing opportunities ... [but also] provide direct economic benefits, including employment and local economic development opportunities associated with tourism and recreational activities” (Glavovic, 2000: 9). Furthermore, formation of a Coastal Management programme seeks to ensure “development in the coastal zone is regulated in such a way as to benefit the greatest number of people while safeguarding important

environmental features and ecological processes of the coast ... [by] integrating conservation principles into planning processes for development” (DEAT, 1998:2).

Amendments made to coastal legislation necessitated institutional restructuring, leading to the establishment of MCM, a governmental regulation body tasked with domestic fishery management and implementing policy prescriptions outlined within the White Paper. MCM's directive, as clearly articulated within the institution's current mission statement, tasks the organisation with the provision of “responsible custodianship of South Africa's marine and coastal resources for the benefit of current and future generations ... achieved by the conservation of such resources through the [orderly] control ... and equitable access to their optimum sustainable utilisation ... in accordance with national [governmental] policy” (MCM, 1999_b: 1). Consistent with the current perception regarding the inherent growth potential, the MLRA [Act no. 18 of 1998] “embodies MCM with the mandate and responsibility to facilitate and co-ordinate the advancement of mariculture in South Africa” (MCM, 1999_c: 1).

1.3.3 Current industry planning status

Formulation of new coastal legislation and institutional reformulation has resulted in MCM being given the mandate of mariculture advancement. However, developments within the relative emergent commercial mariculture industry have historically occurred in the absence of dedicated governmental planning. Consequently, the need to initiate industry planning was seen as a priority by government. In accordance, MCM convened a workshop at the Sea Point Aquarium during October 1999, funded by Norwegian Agency for Development Management [NORAD] as a component of a South African Norway bilateral agreement, and facilitated by MCM's appointment of internationally recognised aquaculture planning expert Dr Nash. The workshop was attended by all relevant mariculture industry stakeholders. This led to the incorporation of representatives from governmental departments, non-governmental organisations, consultants, research institutions and universities, and industry (MCM, 1999_c:1).

The workshop was designed as a platform for commencing mariculture planning, with most sessions being thematic and designed to encourage as much participation as possible from delegates. The openness of the forum provided opportunities for delegates wishing to highlight specific issues. Such sessions were orientated towards identifying specific needs, strategies and policies for development. The final session of the workshop represented a transition from identifying needs and goals to moving forward into the actual planning process (MCM, 1999_c:1-2).

Consistent with the rationale of the workshop, much of the information made available by MCM regarding specifics of the emergent plan is limited to a single discussionary document recording workshop proceedings. Nonetheless, immediate outputs from the workshop included drafts of

proposed mariculture application forms with accompanying application procedures, and preliminary guidelines for mariculture development. These highlight the need for environmentally sustainable initiatives to preserve the vitality and long-term viability of coastal economies. Furthermore, development activities should incorporate partnerships to promote equitable participation and optimisation of long-term social and economic benefits. A number of broad-based objectives identified to guide future industry development were established, and form the basis of MCM's current mariculture planning framework (MCM, 1999_c:2). These aspects and other issues relating to integrated mariculture planning are discussed further in Chapter 6.

1.4 Concluding Remarks

Coastal legislation has recently been reformulated, leading to implementation of the MLRA of 1998. This has been complemented by creation of the Coastal Management Programme that seeks to integrate conservation principles into coastal development planning processes. Furthermore, organisational restructuring has led to the creation of MCM, tasked with promoting and facilitating coastal development. Successful development of the mariculture industry is regarded as an integral component of sustainable coastal utilisation. At present, planning of the industry is in the infancy stages. The creation of preliminary guidelines for mariculture development are based on thematic integration of discussions from a national workshop held for planning and development of the industry. Consequently, the discourse seeks to highlight certain development aspects requiring assimilation within an integrated mariculture industry planning framework. Mariculture development has also been envisioned as proceeding in such a manner so as to maximise social and economic benefits in coastal regions. Establishment of collaborative partnerships thus provide further scope for realising coastal socio-economic development in previously marginalised localities. In light of the current emergent status of the mariculture industry and the multi-faceted complexity of development projects, it is argued partnership arrangements will be most feasible when initially organised as grow-out satellites attached to private-sector industry. Future entrepreneurship opportunities may also be attained by adopting a LED approach to realising partnership initiatives, particularly where attention is given to partnership fundamentals. These include institutional design principles for training and capacity building, as well as technical and financial design principles to promote equity participation (MCM, 1999_c:109-110).

These issues clearly occupy an important role in attainment of envisioned mariculture development initiatives and are subsequently given due attention in following chapters. Attention is also focused on contributing to resolution of current impediments constraining more rapid formal sector industry growth regarding technology, human capital, finance and institutional variables. Particular emphasis is paid to aspects presenting viable areas of public-private collaboration regarding

transfer of advanced technology to commercial and appropriate technology applications, creation of a human capital base, and integrated planning.

In accordance, the exploitative inductive approach governing economic enquiry establishes important foci requiring synthesis into creation of a holistic integrated multi-faceted development framework rather than presenting essentialistic, uncontextualised and abstract directives. As such, the remainder of Part 1 is devoted to presenting theoretical principles upon which investigative enquiry is directed and developmental arguments firmly grounded. Findings of the 2001 National Mariculture Baseline survey are presented to illustrate current industry status and private sector firms concerns regarding governments current management of the industry. Part 2 focuses on expounding institutional and development aspects as they relate to enhancing industry development. This is achieved by adopting a dynamic eclectic approach where the economic-institutional system is viewed as an interactive responsive complex. This is supplemented by a conceptual treatment of planning variables as they relate to realising formulation of an integrated framework guiding future development. Finally, conclusions and recommendations directed towards facilitating consummation of mariculture's inherent development potential are provided in Part 3.

CHAPTER 2: THEORETICAL AND CONCEPTUAL GROUNDING

2.1 Introduction

The following chapter seeks to establish pertinent fundamental theoretical principles, providing a firm conceptual grounding for arguments progressively developed and presented within the following sections. Conceptual introduction is commenced with a brief accord of traditional economic development frameworks. Thereafter specific reference is made to dualism, which not only describes disparities in economic development, but offers useful insight into accounting for forces perpetuating differences in domestic inter-regional socio-economic progress. Furthermore, dualism is utilised to illustrate the need for viable peripheral locality development programmes, such as envisioned socio-economic orientated mariculture development initiatives. Notions of formal sociological dualism are acknowledged, but aspects of technological dualism and distorted institutional frameworks are given greater attention in following chapters. These have been identified as important considerations requiring attention and integration into a multi-faceted holistic mariculture development framework. Finally, new institutional economics is briefly introduced. The paradigmatic stance adopted by this body of thought is consistent within the broader school of development economics, where conceptualisations emerging from institutionalism substantially contribute to analytic frameworks within development economics. As such, the inclusion of institutionally-sourced concepts generates a holistic theoretical framework, while simultaneously enabling appropriate consideration of the vital role institutional mechanisms occupy in influencing and facilitating economic development.

Before proceeding, it is essential to briefly depict the crucial differentiation between the terms economic growth and development. Klein (1977_a:789) defines economic growth as “increases in aggregate product, either total or per capita, without references to changes in the structure of the economy or in social and cultural value systems”. However, economic development includes not only growth, but also social and cultural changes that occur in the development process. A more formative approach is adopted by Thirwall (1983:85), defining economic development as “a multi-dimensional process involving major changes in social structure, popular attitudes and national institutions; as well as the acceleration of economic growth and employment, reduction of inequality and the eradication of absolute poverty”. Zuvekas (1979:9) argues it is “more appropriate to distinguish development from growth by focusing on the types of change occurring in the economic, social and political spheres”. Consequently Spier (1994:38) concludes “growth is not by implication development”.

2.2 Development Economics

2.2.1 Introduction

The field of development economics has become a firmly established discipline arising from a distinctive and dedicated interest exhibited by the school of thought in “investigating the processes by which a poor stagnant economy can be transformed into one whose normal condition is sustained growth” (Chereny & Strout, 1966: 678). Such notions stand in stark contrast to the prevailing situation in the 1940s and 1950s where Hirschman (1982_a:372) comments “development economics [was] a comparatively young area of inquiry ... [perceived] as a subdiscipline of economics”. Certain commentators argue “no single definition or characterisation of economic development adequately captures its multifaceted nature” (Kindleberger & Herrick, 1977:6). This has led to “no consensus among scholars” regarding specific definition of the term (Fusfeld, 1977:744). However, as Thirwall (1983: 8) aptly notes, the term development implies change, “describing the process of economic and social transformation”. Such notions are reinforced by Klein’s (1977_a:786) affirmation that “change is the fundamental premise ... [and] is precisely where modern development begins”. As such, economic development may be perceived as “primarily a set of large scale changes in economic and social processes and attitudes ... [including] changes in population, technology, industrial structure, consumption and investment” (Supple, 1972:20). More specifically, economic development is concerned with “changes in technical institutional arrangements by which it [more output] is produced and distributed ... defined to include improvements in material welfare, eradication of mass poverty, [generation of] employment and greater decision-making participation by citizens” (Kindleberger & Herrick, 1977:1,3).

For this to occur, three basic elements unanimously associated with reform are required. Firstly, the state should occupy an active role in the development process, as opposed to being relegated as a perceived impediment to free market functioning (Perkins & Roemer, 1991:3). For purposes of the discourse, governments are not regarded as mere actors performing non-influential actions, nor are they so thoroughly dedicated as to avidly adopt policy prescriptions by precisely following all its dictates. Rather, an orthogonal view consistent with that of Sah & Stiglitz (1992:208) is adopted, where policy implemented by government is dependent on an existing knowledge base within government, used to democratically examine options and implement the most desirable. Secondly, improving the efficiency with which markets work “is more complicated than text book economic theory would lead one to believe ... [as] certain kinds of behaviour and institutions cannot be taken for granted” (Perkins & Roemer, 1991:3). Finally, efficient productive economic resource distribution. It is recognised that a clear supplementary knowledge of political economy enhances understanding of contemporary contextual resource distribution. However, the nature and scope of the discourse limit causal explanation to various manifestations of dualism in a bid to ensure maintenance of strategic focus. Later use of conceptualisations provided within the scope of new institutional economics permits further examination of institutionally sourced property rights

associated with resource distribution, and their resultant influence over economic development and productive activity trajectories.

2.2.2 Theoretical stances

To achieve these three pre-requisite tenets of economic reform, various conceptualisations and models of development presented through development economic adaptive policy prescription have been advocated over the course of the school's progression. Historical attempts to remedy situations of limited economic growth have resulted in theoretically-sourced macro-economic policy prescriptions modelled on conceptual frameworks often displaying two disappointing characteristics: generic in nature and whiningly tactless in title, presenting themselves as little more than cheap propaganda. Most notably, the Vicious Circle theory "assumes poverty and stagnation are caused by severe population pressure on resources" (Myint, 1971_b: 32). Resultant low labour productivity arises from an inadequate supply of financial capital, implying "a lack of capital is the key factor preventing growth and development" (Zuvekas, 1979:39). Capital shortages are attributed to persistently poor levels of domestic saving characteristic of low per capita income constricting demand. Progressive developments of the approach have led to assimilation of 'big push' notions requiring extensive involvement of a large public sector ensuring a wide collection of diversified investment projects⁸. However, as Myint (1971_b: 32) elucidates the model's strict theoretical assumptions require "pre-existence of a fairly high level of development in the political, social and institutional frameworks". Furthermore, concerns pertaining to excessive authoritative economic activity regulation are often levelled against 'big push' conceptualisations.

Responsive development of Hirschman's 'unbalanced growth theory' seeking to address criticisms leveled at 'big push' notions led to recognition that "development is a gradual process [where] it is unrealistic to think in terms of superimposing a large modern sector on a traditional economy" (Ilchman & Bhargava, 1966:144). However, use of deliberate government action to create 'unbalanced' sector-specific shortages in an attempt to promote complementary investment is open to attack. Indeed, Ilchman & Bhargava (1966:145) comment "the strategy ignores important political, social and administrative factors". These include limited governmental responsibility for comprehensive central planning and execution as "a regime totally sympathetic to serving private sector interests is required ... leading to inadequate social overhead investments in housing, education and welfare programmes" (Ilchman & Bhargava, 1966:145). As such, integration of unbalanced growth theory into a composite model severely constrains the applicability of the approach, compromising the feasible employability of the policy.

⁸ Rosenstein-Rodan's 1943 'balanced growth' or 'big push' argument reasoned that establishing post WW2 domestic markets for industrial output required the simultaneous growth of all industries, necessitating centralised structural planning and direct government investment (Roemer & Radelet, 1991:59). In accordance, 'balanced growth' advocates "stressed simultaneous harmonious expansion of all sectors of the economy ... to minimise project delays and inefficiencies, [creating] a sufficiently large market for industrial and agricultural products" (Zuvekas, 1979:13).

It comes as no surprise that alternative theoretical paradigms were sought. Realisation regarding the “gloomy prognostication of [classical economic theory] ... that progress will ultimately end in stagnation [became] unfounded” (Thirwall, 1983: 4) as greater attention was given to technical progress and international trade in the developmental process. However, emergent outward market-orientated neo-classical economic policy, largely “devoted to spelling-out price setting rules that will maximise social welfare” is not met without critique, specifically when “asymmetric information in principal-agent relationships is included” (Perkins & Roemer, 1991:3). Objections to orthodox neo-classical economic theory’s inextricable ties with preconceptions and biases in favour of policies promoting laissez-faire, free trade, and conservative fiscal and monetary policy (Myint, 1971_b: 29) are often lodged when debates regarding adoption of appropriate development frameworks by emerging economies occurs.

From a developmental economic perspective, criticisms tend to focus on the allocative efficiency of the market mechanism. Arguments progress from those based on purely relative terms which perceive the market mechanism’s functioning to be less effective in developing countries for reasons of greater factor immobility, resource indivisibility and imperfect knowledge. Orthodox neo-classical critique’s concern with efficient resource allocation has assumed a greater significance in the context of new progressive policies for promoting economic development in under-developed countries. As Myint (1966_a:78) argues, “a country which cannot use its already available resources efficiently is not likely to be able to absorb and efficiently use additional resources from foreign aid programmes”⁹. Progressive arguments call for structural economic change as “fundamental disequilibrium in factor proportions cannot be corrected by merely improving the allocative efficiency of the market mechanism on the basis of given resources” (Myint, 1971_b: 10). In addition, the notion of cumulative disequalising forces, which views the “free play of market forces [as] ... fossilising or exaggerating existing market imperfections and ... inequalities in income and bargaining power” (Myint, 1971_b: 13), effectively establishes a dualistic socio-economic distributive structure.

Furthermore, criticism is levelled against advocates who promote the sole adoption of pricing policy to ensure economic growth, leading Klein (1974_b:790) to comment that “price is not the only relevant measure of value”. Klein (1974_b:791) further argues that the pricing mechanism itself is flawed when principally utilised as an economic valuation tool due to varying degrees of demand manipulation. In addition, effective functioning of price signalling mechanisms may be hampered

⁹ Such reasoning has been actively employed to frequently develop rational arguments for varying degrees of state intervention within the economy. Indeed, as Knight (1991: 11) aptly notes, these arguments influenced macro-economic thought “in the period up to the mid-1970s [where] prevailing attitudes among development economists were more anti-price mechanism, pro-planning, pro-intervention and anti-trade”. By contrast the 1980s witnessed western development agencies promoting “less government and more private market activity” (Perkins, 1991:29).

by price distorting monopolies or the limited mobility of production input factors causing inadequate responses to price signals (Arndt, 1985:152). Indeed Biggs & Levy (1991:366) argue policy prescriptions focusing exclusively on pricing mechanisms “implicitly assume markets are frictionless, economic agents are omniscient, and externalities are limited ... or largely internalised by private decision-making [agents]”. However, contrary to such assumptions, the nature and impact of transaction costs and externalities, compounded by recognition of bounded rationality and its influence over institutional functioning and organisational learning, indicates “a conception of industrialisation that extends beyond efficient allocation” (Biggs & Levy, 1991:366)¹⁰.

Finally, concerns over the realism and relevance of both orthodox neo-classical and central planning models of theoretical analysis indicate it is “highly unlikely that any single standard model of development planning will be appropriate” (Myint, 1971_b: 6). This is particularly relevant in context bound and situation specific developing regions where socio-economic status, factor inputs, economy size, and the capacity of institutional frameworks display variation.

Although tracing developments and progressions within development-orientated economic policy frameworks displays historical interest, further pursuit requires a detailed analysis which lies beyond the confines of the discourse. However, of greater conceptual significance is the notion of dualism. This has been selected for its theoretical applicability in adequately describing current challenges facing socio-economic development in the domestic economy, with specific reference to the mariculture industry.

2.3 Dualism

2.3.1 Introduction

Formally, dualism may be defined as “the modern sector consisting of large-scale economic units employing capital-intensive methods of production, and the traditional sector as consisting of small-economic units employing labour-intensive methods of production” (Myint, 1971_b:315). The traditional sector is “organised [around the] resources and needs of self-contained rural communities” (Meier, 1965:49-50). Such subsistence economies are generally characterised by lack of specialisation on a significant scale and the use of ‘stationary technology’ displaying little innovation over time. Furthermore, infrequent production surplus exists where marginal and incidental exchange is dependent upon availability of market surplus and is not the primary objective of economic activity (Meier, 1965:50). Although Hirschman (1964_b: 126) regards dualism

¹⁰ In an interesting argument focusing on processes of evolutionary economic progression and driving forces of technological advance, Martin (1974:772) perceives policies “designed to achieve decentralised competitive market processes of decision-making [as] the most effective instrument for moving society ‘beyond capitalism’ “. The rationale given is that “the technological process is experimental, and market mechanisms, if truly competitive, are more conducive to that process than centralised, bureaucratic, hierarchical alternatives” (Martin, 1974:772).

as resulting from the sudden interruption by 20th century techniques into more primitive societies that are only able to adjust gradually, a more contextual explanation would point to the active pursuit of inward orientated racially skewed development policies adopted by the previous regime.

2.3.2 Generic theoretical causal approaches

Myrdal's (1963: 23) 'Process of Cumulative Causation' seeks to further explain inter-regional geographic development differences by asserting that economic and social forces produce tendencies towards disequilibrium. Economic activity favours regions with greater levels of social and economic development. This is augmented by labour migration motivated through urban-rural wage differentials¹¹. Under-developed rural areas become further devoid of human capital, reducing the marginal productivity of labour and the demand for services and factors of production. Permanent loss of labour by the indigenous economy may establish conditions for cumulative decline of the traditional economy. Through processes of cumulative social change, expansion within more developed regions induces further physical infrastructure improvements, enhancing productive efficiency and exacerbating the rural-urban divide (Thirwall, 1983: 135-137). As such, Myrdal (1963: 26) regards emergent market forces and urban dominated investment as being able to account for the persistence of spatial differences regarding per capita income, industrialisation and employment level disparities. This contrasts neo-classical equilibrium theory which assumes processes of factor mobility equalise inter-regional wage and profit rates (Thirwall, 1983:136). The resultant drain of rural resources ultimately establishes an authoritative hierarchical spatial system where peripheral regions become increasingly dependent on the core for social and economic support.

The notion of labour transfers to urban localities based upon wage differentials, whether real or perceived, renders urban specific development policies paradoxical. Generation of employment opportunities in established industrial areas encourages further migrant activity causing urban regions to become caught in high level unemployment traps. As such, Stohr & Taylor (1981: 63) argue adoption of traditional spatial development policies "do not improve or even stabilise living levels in the least developed areas of third world countries ... [due to] the utter futility of attempting to absorb such masses of migrants into restricted urban labour markets, and supplying basic urban infrastructure and services for them". This emphasises the importance of domestic economic policies that seek to promote peripheral regional economic development via removal of impediments that generate inequalities in scarce resource allocation. In accordance, policies promoting the formation of large-scale manufacturing industry effectively formulate distinct regional

¹¹ Indeed, employing Todaro's urban-rural migration model, it can be algebraically illustrated that rural labour supplied to the urban region is a function of the expected rural-urban wage differential. Migration halts when expected urban wage equals actual rural wage, such that the equilibrium level of employment is: $U^* = wyN/r$, where w is urban real wage ; y is rate of urban job creation ; N is level of urban employment ; r is average rural wage (Todaro, 1985).

economic unions, “while the more fundamental problem of promoting internal economic integration ... is neglected” (Myint, 1971_b: 317).

Such descriptive accounts of dualism adequately introduce the concept and accord the persistence of dualistic development to inter-regional urban pull labour migration movements and cumulative urban-biased economic growth. However, a more formal analysis is required if mitigating factors are to be accurately identified and successfully addressed. As such, an alternative conceptualisation of dualism more specific in detail involves social and economic divisions within an economy. This includes differences in the level of technology between regions; differences in the degree of geographical development; and differences in social customs and attitudes between indigenous and imported social systems (Thirwall, 1983: 133-134).

2.3.3 Alternative conceptualisations

Boeke (1953:3) argues it is “possible to characterise a society, in the economic sense, by the [prevailing inter-related aspects of] ... social spirit, organisational forms and technique dominating it”. As such, sociological interpretations of dualism perceive coexistence of an exchange economy and subsistence sector “as evidence of sociological rigidities creating special obstacles to economic development. This is because individuals in the subsistence sector ... are not supposed to respond to economic incentives in the normal way, either because they have limited wants for the commodities available in the exchange economy, or because of their conservatism or ignorance” (Myint, 1971_b:319). It should be duly noted that although these claims violate the assumption of economic rationality and maximisation, such behaviour can only be justified to the extent that subsistence systems remain completely insulated from the market economy.

Indeed, as Boeke (1953:4-5) further comments, distinction of a true dualistic society is virtually impossible, as through progressive social forces, a social system will display both the remains of the preceding system and the beginnings of the new. Thus through processes of evolutionary endogenic social progression, a displaced societal system constantly moves towards marginalisation as the new system penetrates through all strata of the society. As such, notions of a dual society should be theoretically reserved for “societies showing a distinct cleavage of two synchronic social styles ... which are separated from each other by transitional forms [such as] pre-capitalism and [imported] high capitalism” (Boeke, 1953:3).

Socio-cultural practices exhibit a definite influence over economic development patterns. Indeed, in formulation of a theoretical approach to explaining macro-economic institutional development, Fustfeld (1977:253) argues that “economic institutions are part of a larger social structure” where meaningful enquiry requires extended analysis of “[indigenous] social structure and social organisation”. However, a definitive analysis of such variables lies beyond the confines of this

discourse. This is largely due to the sheer magnitude and complexity involved in identifying and establishing causal effects of context bound socio-cultural practice in response to specific development policies. However, in the interests of ensuring holistic coverage of development aspects relevant to the realisation of envisioned mariculture development initiatives within peripheral coastal localities, four [rather contentious] sociological barriers to economic development are briefly presented in the footnote below¹². It should be duly noted that the aforementioned constraints are generic in nature, reducing relevance with regard to the numerous context bound micro and socio-economic developmental constraints amongst rural coastal localities. However, this does not infer that development remains unhindered by limited institutional capacity as progressions towards social homogenisation occur. Indeed, such notions are reinforced by Meier (1965:64) who “[does] not deny some existing social and cultural institutions of underdeveloped countries ... constitute a barrier to economic development”.

It can thus be reasonably accepted that although the domestic South African economy displays distinct patterns of dualistic socio-economic development, the strict notion of absolute sociological dualism representing two distinct economic systems can be refuted. As such, generic assumptions of universal rational economic man prevail, and persistence of dualistic development can be confidently associated with alternative factors. Contemporary discontinuity between the two economies [sectors] may thus be largely attributed to sector and regional specific policy practices and resultant disparities in economic resource allocation, rather than intrinsic economic-development constraining behavioural differences displayed by economic agents within various social frameworks.

Of particular relevance to the feasible development of envisioned socio-economic development mariculture initiatives are institutional structure and organisational capacity influencing resource distribution, as well as technological and financial dualism. The dichotomy of larger scale capital intensive production techniques employed within urban localities is often attributed to “the inevitable result of underdeveloped countries need[ing] to adopt [foreign] advanced technology” (Myint, 1971_b:323) and the conservatism and traditional backwardness of peripheral localities necessitating labour-intensive techniques. Although such explanations have persistently endured,

¹² Firstly, dilution of fundamental individual economic incentives arises from collectivist-orientated family systems. As such, the incentive to save, invest and work more diligently is reduced when results of individual action are divided among many beneficiary family members. Secondly, a limited scope of entrepreneurial spirit arising from the lack of a capitalistic system. Thirdly, a ‘backward-sloping supply curve of effort and risk-taking’ due to the absence of a ‘demonstration effect’ where actions of aspiring individuals centre around greater risk taking as attempts to emulate those who have achieved wealth are made. Finally, the contentious issue of the ‘population multiplier’ where a rise in per capita income without population control is argued to increase population growth rates. An argument is developed for promoting investment in manufacturing and market expansion to ensure that the expanded population does not remain unemployed or revert to subsistence agrarian activities (Meier, 1965:63-64). Although population growth plays a conflicting role in developmental processes by “acting as either a stimulant or impediment”, the most important issue is the “rate of technological innovation [to ensure] rapid population growth [does not] inhibit increases in capital per worker” (Thirwall, 1983:153).

supplemented by recognition of higher wage price and lower interest rates on financial capital in the modern economy, little is divulged regarding reasoning for sector or locality specific price disparities of factors of production.

Myint (1971_b:323) attributes the prevalence of higher urban sector wages to greater labour organisation where the establishment of trade union institutions seeking to protect members' working rights exerts sufficient bargaining power to influence wage rates. Workers are thus able to "protect themselves by acting collectively" (Baleni, 1996:79). Alternatively, Sah & Stiglitz (1992:186) argue that higher wages paid by one firm exerts a deleterious effect on another's labour turnover and worker effort, "as the cost of being dismissed by another firm may be reduced if [the worker's] opportunities have been improved". In addition, the urban bias displayed by financial capital lending patterns leads Spier (1994:40-41) to argue that the "formal financial sector as it is presently structured, is ill-suited to serve the informal sector or the population at large including the poor ... as banks prefer large borrowers over small ones". Such notions are reinforced by Goulet (1985:288), who regards ordinary banking institutions as being inadequate in financing development initiatives in emerging economies. The ultimate implication, barring further legislative and human capital considerations influencing technological rigidities, is the maintenance of artificial factor prices within the respective sectors (Myint, 1971_b:323). This effectively institutionalises a self-induced allocative system that does not adequately ensure efficient use of available factor endowments.

Although dualism provides interesting foundational insights into mitigating factors perpetuating inter-regional development disparities, the focus of attention is now directed towards incorporating fundamental concepts within institutional economic thought. This is done in an attempt to provide further insight regarding the impact of institutional variables in the economic development process. Furthermore, this simultaneously establishes additional theoretical grounding for emergent perspectives developed in following chapters.

2.4 Institutionalism

2.4.1 Introduction

The divergent operating paradigm of institutional economics stems not only from dissatisfaction with limitations and rigidities of traditional economic doctrine, but seeks to establish an emergent form of analysis based upon committed attention towards pragmatism and behavioural psychology. In accordance, this has enabled generation of a holistic approach embracing two basic conceptions. One relating to evolutionary processes operating within the economic system as a whole, and the other to the nature of human behaviour. Human behaviour is conceived as being characterised by cultural-conditioned habitual patterns, yet capable of intelligent response to

changing realities (Street & James, 1982:673-674). This has enabled institutionalism to extend the boundaries of economics in both depth and range via the vital recognition regarding the importance and nature of a number of variables. These include relationships between legal institutions and economics; the evolutionary view of economic activity as a component of and only holistically understood in terms of the existing cultural complex; and its emphasis for exact empirical enquiry based on the systematic collection and interpretation of statistical data based on both historical and contemporary contextualisation of systems (Dorfman, 1963:9). As such, “institutionalists seek to construct pattern models ... explain[ing] human behaviour by carefully placing it in its institutional and cultural context” as opposed to the neo-classic construction of predictive models based on questionable limiting assumptions used to generate deductions (Dugger, 1979_a:900).

2.4.2 New institutional economics

These principles have led traditional institutionalists to refute the unquestionable acceptance of the market as the driving force of the economic system (Dorfman, 1963:23). Indeed, one of the three pillars of thought upon which traditional institutional economics is based includes Veblen’s perception that industrial technology is the real subsistence of the modern economy. Simply expressed, Veblen purports the “state of industrial arts gives occasion to exchange”, thereby implying “the extent of the market is always limited by the state of the industrial arts” (Ayres, 1963: 52). Application of Veblen’s ideology leads Klein (1977_a:787) to argue “all economies are developing if for no other reason than that technology is always changing”. The other two principles refer to property rights and transaction costs.

However, for the purposes of developmental issues surrounding the domestic mariculture industry, and in the vein of adopting contemporary pertinent theoretical grounding, pervasive conceptualisations are largely sourced from the ‘new institutional economics’. Kherallah & Kirsten (2001:2) report that the new institutional economics “acknowledges the important role of institutions, but argues that one can analyse institutions within the framework of neoclassical economics ... [by relaxing] some of the unrealistic neoclassic economic assumptions, [but maintaining the notion of] self-seeking individuals attempting to maximise an objective function subject to constraints”. Furthermore, methodological individualism is redefined so as to move away from describing the actions of collective entities by focusing explanation upon the positions and actions of individual economic agents. Consequently, Hodgson (1989:56) reports the principle of methodological individualism involves the recognition that “all actions are performed by individuals implying a social collective has no existence and reality outside the individual members’ actions”. In addition, such micro-economic explanations operate on the premise of bounded rationality, reflecting the “idea that individuals have only limited ability to acquire and process information ... and although assumed to be intendedly rational, are not hyper-rational” (Furubotn &

Richter, 1991:4). As such, restrictions on rationality explicitly imply that all economic exchange cannot be organised by market allocative and distributive mechanisms alone. This leads Miller (1978:14) to conclude that institutional economics “is evolutionary, collective, interdisciplinary and non-predictive”.

It is important to recognise the unrealistic stringent assumptions required by neo-classical economic doctrine to achieve Pareto optimality generates a hypothetical universe, where the outcomes of idealised perfect competition establish traditional theoretical efficiency standards. However, in light of unavoidable real-world constraints, relative evaluation of any practical policy results with respect to neo-classical criterion would inevitably cause any outcome being classified as sub-optimal or inefficient. As such, factors assumed as ‘given’ become crucial variables from which to launch an economic development-immersed enquiry (Klein, 1977_a: 789). Rather than arduously attempting to single handedly reformulate economic theory, Furubotn & Richter’s (1991:13) perspective of relative efficiency where “a system’s solutions are efficient if they meet the constraints that characterise it” is adopted. As such, efficiency exists when potentially avoidable constraints are successfully avoided (Furubotn & Richter, 1991:14). In accordance, the ideology of Commons’ (in Chamberlain, 1963:79-80) volitional approach¹³ is acknowledged involving distinction between “complementary factors or routine transactions, and limiting factors or inhibitors of goal achievement” (Chamberlain, 1963:79-80). The use of strategic transactions, which “represent the dynamic element ... [and] alter the set of incentives or constraints that will bear on routine transactions” (Rutherford, 1983:726), becomes a basis for establishing “working rules” allowing for resolution of conflict and the control of limiting factors.

2.5 Concluding Remarks

The holistic field of development economics displays a dedicated integrative treatment towards understanding and realising processes of economic and social transformation. These extend beyond sterile market-orientated measures based on price mechanism functioning for promoting isolated aggregate product increases. As such, the school of thought provides an array of inductive complementary theoretical frameworks seeking to enhance understanding of development processes and variables. This includes conceptualisations of dualism, which describe inter-regional development disparities. Analysis of generic dualistic theoretical causal approaches provide interesting foundational insights into mitigating factors perpetuating regional economic development differences. Further, it demonstrates the need for peripheral locality development [consistent with notions of envisioned socio-economic orientated mariculture development initiatives amongst previously marginalised coastal localities] to alter core-periphery dependence relationships. The difficulties exerted by sociological dualism upon development

¹³Refers to ‘purpose and willingness’ which Commons saw as guiding individual and organised activities (Chamberlain, 1963: 76).

processes are acknowledged, but prevalence of a quasi-homogenised social order consistent with greater rural-urban social interaction than permitted by simplistic two economy industrial-subsistence models is accepted.

Expansion of the domestic mariculture industry provides significant impetus to coastal development and offers potential for addressing the previous political regime's inward orientated racially and geographically skewed development stance. Presentation of baseline findings in Chapter 3 demonstrates the industry is currently dominated by capital and technology intensive high-value export orientated abalone cultivation in the West Cape province. However, promotion of spatial distribution of development and diversification of mariculture using different species suited to various climatic localities along the domestic coastline requires developmental and institutional support. In accordance, greater attention is given to addressing aspects of technological and financial dualism in the following chapters where financial capital availability and appropriate technology development-dissemination aspects are discussed. Furthermore, issues involved in the promotion of human capital development through establishment of a practically-orientated skills base are also examined.

Dissatisfaction with traditional economic doctrine's treatment of institutional aspects essential for development implementation, supplemented by the need for a more realistic behaviourist approach, has led to the introduction of new institutional economics. The sub-discipline has been utilised to provide theoretical grounding for institutionally-orientated variables associated with virtuous development of the domestic mariculture industry. This includes aspects of property rights, transaction costs/asymmetric information and co-operative organisational arrangements. Furthermore, attention will also be drawn to the importance of responsive flexible organisational structures in industry-specific planning and programme implementation processes, essential for the active development of the mariculture industry.

CHAPTER 3: MARICULTURE INDUSTRY

3.1 Introduction

The following chapter presents a micro-economic evaluatory analysis regarding the contemporary status of the domestic mariculture industry based on an articulation of data generated during the 2001 National Mariculture Baseline Survey (Hepburn et al., 2001). It should be duly noted that data presented is drawn from an interim report to the Economic and Sectoral Study [ESS] of the South African Fishing Industry. Orthodox micro-economic approaches are generically concerned with disaggregation of macro-economic variables. Emphasis is attached to the composition and allocation of resources to total production utilising price theory to establish the composition, pricing components and direction of scarce productive resource flows (Bilas, 1971:1). As the individual agent forms the unit of analysis, Browning & Browning (1989:2) regard micro-economics as particularly “capable of dealing with some of the most important social issues of the day”. Indeed, the adoption of such an analysis is particularly suited to the emergent status of the contemporary mariculture industry. The ensuing paradigmatic framework that focuses upon methodological individualism allows important insight from the specific nature of the institutional-economic system unique to the industry to be gained.

3.2 Research Design

The primary objective for the baseline study was to capture the essential operating features, size, structural composition and potential expansion trajectories, as well as pertinent concerns of individual operators within the domestic mariculture industry. Indeed the importance of accurate statistics is highlighted by Nash (1988_b:56), who argues “without good production [and] economic worth estimates ... the public and private sectors cannot establish needs and priorities, and plan or invest profitably”. The research design, referring to a programme that guides the process of collecting, analysing and interpreting data (Nachmias & Nachmias, 1990: 75) has largely been guided by the interrelated epistemological¹⁴ and methodological¹⁵ assumptions consistent with the positivist paradigm¹⁶. It should be noted that the researcher recognises that since all paradigms “rest on untestable metaphysical assumptions, none can be incontrovertibly right” (Durrheim, 1999:37). The rising challenge mounted by post-modernism against the 20th century orthodoxy of utilising positivism in the social sciences bears testimony to this. However, the need for generation of quantifiable data motivated incorporation of positivist principles in the research design. As such,

¹⁴ Epistemology refers to assumptions upon which the foundations of knowledge are built.

¹⁵ Methodology establishes modes of acquiring knowledge.

¹⁶ Carr & Kemmis (1990:61) report the term ‘positivist’ was first introduced by Comte, who utilised it to ‘convey an opposition to any metaphysical or theological claims that some kind of non-sensorily apprehended experience could form the basis of valid knowledge’.

a comprehensive standardised survey orientated questionnaire schedule was constructed by the researcher where data gathering processes would be facilitated by the presence of a personal interviewer.

3.2.1 Survey Construction

The ESS provided the opportunity for base line data to be obtained from the mariculture industry. The researcher was responsible for construction of the survey questionnaire. Design of the survey questionnaire was based on the following two criteria. Firstly, to provide comprehensive economic base line data, and secondly offer insight to the possible nature of future industry development trajectories. It is important to recognise the draft questionnaire was formulated around the rationale that it would be administered as a survey, facilitated by the presence of a personal interviewer. This was communicated to the researcher prior to survey design. Once the draft schedule was completed by the researcher, it was subject to review. This included appraisal by both thesis supervisor and co-supervisor, input from a NORAD aquaculture specialist temporarily posted at MCM, MCM itself through approval by the divisional Resource Utilization and Development in the Directorate Economic and Resource Development for Mariculture, and an industry representative. Relevant amendments were consequently made by the researcher before the schedule was released as a national base line survey. Appendix 1 contains a copy of the 2001 National Mariculture Baseline survey questionnaire distributed to industry.

It is important to note that schedule-structured interviews are based on the following crucial assumptions. Firstly, respondents have a sufficiently common vocabulary so that it is possible to formulate questions that have the same meaning for each of them. Secondly, all questions can be phrased in a manner that is equally meaningful to each respondent. Finally, for the meaning of each question to be identical for each respondent, the context must be identical and, since all preceding questions constitute part of the context, the sequence of questions must be identical (Nachmias & Nachmias, 1990: 189). In accordance, the schedule-structured questionnaire was constructed such that question wording and sequencing were fixed and identical for each respondent to ensure standardisation. This helped to maintain the criteria of validity¹⁷ and reliability¹⁸, while the use of a standardised series of predetermined categories “permits comparability between responses” (May, 1993: 92) and the tentative formulation of generalisations.

Use was made of both factual questions designed to elicit objective quantitative information, and intensity-orientated opinion questions affording respondents the opportunity for written expression of attitudes. This was done to help overcome de Vaus’s (1996:8) critique that surveys are often

¹⁷ Validity implies that a test is valid to the extent that inferences made from it are appropriate, meaningful and useful (Rankin & Vandum, 1998: 303).

¹⁸ Reliability is an indication of the extent to which a measure contains variable errors (Nachmias & Nachmias, 1990: 148).

“too restricted [due to] their reliance on highly structured questionnaires”. The need for qualitative telemetry was obtained through the sparing use of open-ended questions which require participants to construct their own answers (Rankin & Vandum, 1998:295). This is consistent with the explorative and inductive developmental nature of the research, seeking to generate holistic knowledge regarding participants’ perceptions regarding topical issues pertinent to development of the contemporary mariculture industry. These include attitudes towards institutional factors influencing the performance and growth of the industry, and perceptions pertaining to the potential creation of CPP relationships. Such questions were included as they “allow the [participant] to freely respond in any desired manner” (Orlich, 1978: 45). Evaluation of responses to open-ended questions is conducted utilising a content analysis process where individual answers were systematically reviewed, enabling the identification of common themes to ensure meaningful categorisation of responses (Peterson, 2000:35).

The need for generating cohesive tabulable quantifiable data necessitated the dominant use of close-ended questions requiring participants to choose answers from a list of options (Rankin & Vandum, 1998:295). These fixed choice questions were linked to a Likert-type linear response rating scales, regarded by Orlich (1987:52) as the most widely used ordinal scale consisting of five or more response categories. Presentation of questions in this format ensures they are quick to answer, require less motivation to communicate on behalf of the respondent, and are generally perceived as less threatening. Furthermore, Peterson (2000:38) reports that such questions require less physical and mental effort as participants are merely required to react by selecting an appropriate pre-specified response. The use of contingency and associated preceding filter questions “where each successive question is set more specific than the preceding one” (Peterson, 2000:109) was employed in an attempt to ensure that only responses from affected participants were elicited.

3.2.2 Data gathering

The relative infancy and limited size of the mariculture industry negated the need for representative research sampling. As such survey data was intended to be obtained from 100% of the population. Van Vuuren & Maree (1999:281) warn, “it is imperative that the quality of the research is not compromised by weak questionnaires or inappropriate data gathering techniques”. As previously mentioned, thorough research design by the researcher and subsequent review of the draft survey by relevant stakeholders created a robust, logically structured and holistic survey questionnaire. However, it is on van Vuuren & Maree’s (1999) second criterion pertaining to the appropriateness of data gathering techniques that positive comment must be reserved. The data gathering process was controlled by ESS co-ordinators who had selected the services of a private consultancy through tender. As such neither the researcher nor the Department of Economics and Economic History of Rhodes University were involved in any direct manner with data collection.

As previously mentioned, the researcher was under the impression that the formulated schedule-structured questionnaires would be conducted within the presence of a facilitatory interviewer on a face-to-face basis. Advantages of utilizing this method include its applicability in obtaining detailed information from heterogeneous populations exhibited by the technique's high response rates, as well as affording interviewees the opportunity to ask for clarification regarding misunderstood questions. Furthermore, greater control over the interview situation by the interviewer ensures that respondents provide answers to all questions on the schedule (Nachmias & Nachmias, 1990:192). However, costs associated with paying interviewers and covering travel expenses are obvious deterrents (van Vuuren & Maree, 1999:282). Indeed, pursuit of the profit motive appears to have driven the private consultancy's data gathering processes. Electronic media [e-mail and fax] appear to have been used to administer survey questionnaires. This lies in contrast to the proposed data gathering techniques communicated to the researcher during research design. This disregard for intended survey administration may have contributed to incomplete returned questionnaires.

3.2.3 Data analysis

Incomplete data obtained by the ESS has ultimately undermined the potential comprehensiveness of the base-line survey. Nonetheless, the results were analysed by the researcher to collate the findings presented in the interim report to the ESS. The researcher received guidance from both supervisor and co-supervisor during creation of the document. The completed interim report serves as a strategic attachment to the larger ESS Fisheries Study, and currently awaits presentation to MCM. As such, findings presented in the discourse draw on presently unreleased data compiled by the researcher.

Due to the questionable data gathering techniques employed, it is important to note that data presented in the report and discourse refers to a 93% sample of private sector commercial mariculture firms. The quality and validity of findings presented are preserved by omitting categories with insufficient data sets. Most significantly, this has led to absence of cost data analysis and share holder profiles. However, presentation of data contained within the thesis and corresponding base line report is accurate, and provides a coherent representative picture of current industry status and perceptions.

The compiled data presented employs a degree of abstraction¹⁹ and should be regarded as predominantly descriptively statistical in nature where emphasis is attached to describing industry structure in both quantitative and qualitative terms. As such, the ensuing analysis is categorically divided into three groups. Firstly, economic structure of the industry detailing aspects of firm

¹⁹ Abstraction involves the 'grouping of events or things into a class defined by one or a few critical attributes' (Thompson, 1973:3).

structure, geographical location of operations, production, and labour. Secondly a qualitative treatment of industry perceptions regarding their operating environments and attitudes towards establishing potential CPP relations. Finally, a brief overview of current sustainable development explications in the domestic mariculture industry is provided.

3.3 Economic Structure

3.3.1 Firm structure

The domestic mariculture industry consists of a small but growing number of domestically owned commercial firms. Although Thompson (1973:21) reports that the occurrence of an organisational revolution commencing in the 1950s witnessed the rise of self-perpetuating de-personalised enterprises accompanied by a “parcelling-out of the entrepreneurial functions to managerial specialisation”, the majority of contemporary mariculture operations remain autonomous independent owner-entrepreneur or constrained partnership based entities characterised by centralised ownership functions regarding business activity management. Traits of the emergent industry are consistent with Barreto's (1989:18) micro-economic sourced entrepreneurship characteristics of “alertness ... and capacity for perceiving opportunity”. As Wonnacott & Wonnacott (1979:97) note, the structural simplicity of such organisational forms, whether a single proprietorship or limited partnership company, affords the business a high degree of flexibility. Owner-entrepreneur based firms are generally ascribed as small and medium-sized peripheral businesses. They are distinguished by limited access to financial capital, profit retention and re-investment by owner, few market entry barriers, expansion potential dependent upon local market growth, and limited commitment to research and innovation (Thompson, 1973:23). However, although current mariculture firms display the first two generic characteristics, the baseline revealed remaining characteristics to be inaccurate descriptions. This demonstrates the danger of adopting arbitrary categorical classification systems that seek to generalise owner-entrepreneur firm attributes. As a thematic integration of the interim baseline results presented in the remainder of the chapter will duly demonstrate, contemporary mariculture firms are characterised by relatively high capital-labour ratios, produce high value output consumed domestically or exported to global markets, and suffer market entrance barriers arising from the composite structure of the prevailing institutional-economic system.

3.3.2 Geographical distribution

As figure 1 clearly demonstrates, 28 entities are currently recognised as independent private mariculture firms, of which 21 are classified as currently operational, where the majority are located within the Western Cape Province. The aggregate enterprise market value referring to what the owner would receive from sale of the business if sold on the open market of currently operational firms within the domestic industry is approximately R252 355 000 (Hepburn et al., 2001:26). Table

1 outlines permit distribution by species, where current commercially cultivated species include abalone [*Haliotis Midiae*], oyster [*Crassostrea Gigas*], mussel [*Mytilus Galloporvincialis*], seaweed [*Gracalaria*], fish [*Scophthalmus Maximus*] and prawn [*Penaeus Indicus*].

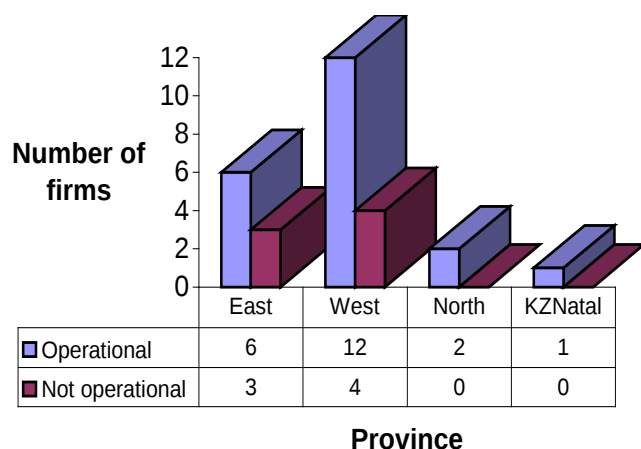


Figure 1: Firm distribution by province

Source: Hepburn et al. (2001:14)

The Western and Eastern Cape provinces provide the dominant localities with regard to current and future firm expansion. This is reiterated by table 1 on the following page, geographically demonstrating provincial permit distribution by distinguishing between operational and not operational permits [associated with zero commercial production in the year 2001]. A total of 37 permits have been issued legally entitling holders to engage in mariculture activities. Of these 24 are classified as active by being directly associated with commercial production in the year 2001 (Hepburn et al., 2001:12). The remaining permits classified as not operational are exclusively held by firms in the Western and Eastern Cape, securing the provinces' position as dominant future locality for further expansion.

Table 1: Permit distribution by province, species and operational status

		Eastern Cape	Western Cape	North Cape	KZNatal
Abalone	Operational	1	10	1	
	Not operational	2	4		
Oyster	Operational	4	1	2	
	Not operational		2		
Mussel	Operational		1		
	Not operational		1		
Seaweed	Operational	1	1		
	Not operational		2		
Fish	Operational		1		
	Not operational		1		
Prawn	Operational				1
	Not operational				

Source: Hepburn et al. (2001:14)

Note: Some firms hold multiple permits. Not operational designates a permit that is not associated with commercial production during the year 2001.

It is important to recognise that although multiple permits are held by single firms, most currently operational firms only engage in one productive activity. Furthermore, although multiple permits held by certain established firms affords potential scope for realising diverse species production, important property right implications arise regarding expanding future dynamic equality in opportunity. In accordance, prior permit issue by MCM has effectively endowed certain pioneering mariculture firms with significant latent organisational power by virtue of their multiple right holdings. This could possibly contribute to distorted centralised economic industry structure if new permit applications are denied and entrance impediments remain unaddressed.

Table 2 below demonstrates operating activities [grow-out farming and ranching or spat production] by province and town for firms classified as operational and not operational. The large concentration of abalone producing firms located within the Western Cape may be primarily attributed to the historic distribution of the fishery. The fishery occupied a pivotal role in regional employment generation and socio-economic development through the establishment of strong linkages to related economic activities, most notably fish processing, and boat maintenance and building (Bridgeman et al., 1992:50). Diversification of larger firms from the fishery into mariculture ventures utilising established infrastructure, combined with the need for direct controlling interests in activity management, has resulted in the majority of abalone production occurring in the Western Cape. The limited number of abalone firms may tempt one to classify them as a differentiated oligopoly characterised by “a few sellers selling products which are good substitutes ...[demonstrating] a high cross elasticity of demand” (Bilas, 1971:236) where “the number [of firms] is not so large as to render negligible the contribution of each” (Ferguson, 1972:334). Accordingly, abalone producers could be regarded as a differentiated oligopoly to the extent that brand identification [particularly strong among Asian clients] influences consumer choice. In the absence of such traits, exported abalone products will be perfect substitutes, establishing a pure oligopolistic domestic producer market structure. However, oligopolistic descriptions of domestic abalone producing firms are not applicable when final product pricing and inability to collude, preventing potential cartel organisation, are considered, as all output is exported to the highly competitive global market where the relatively limited market share held by South African producers clearly establishes them as price-takers.

Table 2: Operating activity distribution by province and town

PERMIT		OPERATING ACTIVITY	E.C.	P.Elizabeth	P.Alfred	Hamburg	Haga Haga	W.C.	G.baai	Hermanus	S.baai	Kleinmond	Overberg	J.baai	Saldanha	Cape Town	Velddrif	Knysna	N.C.	P.Nolloth	A.Bay	K.Z.N.	Gingindlovu		
Abalone	O	Farming & Ranching	1	1	0	0	0	9	2	4	1	1	1	0	0	0	0	0	0	0	0	0	0		
		Spat	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0		
		SubTotal	1	2	0	0	0	10	2	5	1	1	1	0	0	0	0	0	0	1	1	0	0	0	
	N/O	Farming & Ranching	2	1	0	0	1	4	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	
		Spat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		SubTotal	3	1	0	0	1	4	1	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0
Total		4						14											1			0			
Oyster	O	Farming	4	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	
		Spat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	
		SubTotal	4	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0
	N/O	Farming	1	1	0	0	0	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
		Spat	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SubTotal	2	1	0	1	0	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Total		6						3											2			0			
Mussel	O	Farming	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
		SubTotal	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
		N/O	Farming	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	SubTotal		0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Total		0						2											0			0		
	Seaweed	O	Farming	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
SubTotal			1	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
N/O			Farming	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
		SubTotal	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
		Total	1						3											0			0		
Fish		O	Farming	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	SubTotal		0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	N/O		Farming	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
		SubTotal	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
		Total	0						2											0			0		
	Prawn	O	Farming	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
SubTotal			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
N/O			Farming	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SubTotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	0						0											0			1		

Source: Hepburn et al. (2001:15)

Key: O – Operational; N/O – not operational

¹: EC – Eastern Cape; P.Elizabeth – Port Elizabeth; P.Alfred – Port Alfred.

²: WC – Western Cape; G.Baai – Gans Baai; S.Baai – Stompneus Baai; J.Baai – Jacobs Baai.

³: NC – Northern Cape; P.Nolloth – Port Nolloth; A.Bay – Alexander Bay.

⁴: KZN – KwaZulu-Natal

The Eastern Cape acts as the dominant locality with regard to oyster production, confirmed by recent findings that Port Elizabeth bays provide the highest national growth rates. In 1999, MCM perceived the mussel contingent as being poised for dramatic growth in the near future through the addition of 6 new potential entrants (MCM, 1999_a: 3). Furthermore, mussel farming was regarded as displaying viable potential as a socio-economic orientated mariculture development initiative. MCM envisaged mussel farming as developing “along the lines of small-scale farmers owning 2 to 3 rafts .. [and] selling their product to the market via existing fishing companies or co-operatives” (MCM, 1999_a:7). Furthermore, the export potential of value-added products was perceived to offer “good growth opportunities provided present shortcomings in the public health system of growing waters management can be addressed” (MCM, 1999_a:7).

At present, mussel production is disappointingly limited to one operator located in the Western Cape. The presence of a single mussel producer may be perceived as a domestic monopolist by virtue of strict economic terminological definition, as the operator is “the sole producer of a product with no close substitutes” (Browning & Browning, 1989:327)²⁰. However, the monopolistic position has not been established via sole ownership of all raw material supplies. Neither has it been attained by economies of scale associated with production technologies exhibiting a constant downward sloping long-run average cost curve characteristic of a natural monopoly such as public service utility provision, nor through the possession of patents providing exclusive access to vital production technologies specific to mussel production (Browning & Browning, 1989:330). Rather, entry lags, export licensing agreements and the presence of domestic economic-institutional market barriers beyond the control of the individual producer serve as a more plausible explanation. Indeed, suppressed local markets remain problematic and fresh live produce export to Europe is limited by transportation costs, intense Spanish competition and European Union [EU] regulatory directives pertaining to water quality and human consumption of final product (Froget, 1998: 32-35).

Seaweed is produced in both the Eastern and Western Cape, either as feed for abalone or for the extraction of agar. Unfortunately the absence of agar and alginate extraction capacity is seriously limiting the catalytic development potential of the contingent. Indeed, this has resulted in the majority of contaminant free primary product associated with the seaweed industry, easily gathered as sustainable beach cast seaweed by marginalised local communities, being exported rather than undergoing domestic value-added processing. Fish production is currently limited to a single operator in the Western Cape. Prawn production is confined to KwaZulu-Natal due to subtropical climatic constraints of the species (Hepburn et al., 2001:10-11). The potential entrance of new mariculture operations along the province’s coastal zone is constrained due to extensive coastal

²⁰ It is acknowledged that the extent of substitutability between mussels and other marine foodstuffs on the domestic market is dependent on relative price elasticities and revealed consumer preferences, and is currently unknown.

belt utilisation by industry and real estate development, or conservation activities in the form of declared protected marine reserves²¹. Indeed, MCM (1999c:29) comments that “several South African [prawn farming] companies are now seeking to invest in Mozambique”.

Table 3 below demonstrates the main demand sources for product, supplemented by market perceptions reported by various producers of currently cultivated species. As can be seen, exports of both high-value abalone onto stable international markets and low-value unprocessed seaweed was already occurring in 1998. Continual growth in demand for South African cultivated prawns has witnessed a deviation in main demand source from domestic to foreign markets. Oyster, mussel and fish producers are currently affiliated with a stable or growing domestic market. Quality control testing on final product by 89% of domestic firms demonstrates commitment towards the cultivation of quality produce meeting local and global health standards (Hepburn et al., 2001:18,26).

Table 3: Market perceptions of operational firms

Permit type	Species	Operating activity	Average market perceptions						Main demand source		
			1998	s ¹ %	1999	s %	2000	s %	1998	1999	2000
Abalone	Haliotis Midae	Farming & Ranching	Growing	20	Growing	40	Stable	90	E ²	E	E
		Spat	Stable	100	Stable	100	Stable	100	OMO ³	OMO	OMO
Oyster	Crassostrea Gigas	Farming	Stable	67	Stable	76	Stable	85	D ⁴	D	D
		Spat	Growing	100	Growing	100	Growing	100	OMO	OMO	OMO
Mussel	Mytilus Galloporvicialis	Farming	Unstable	100	Growing	100	Growing	100	D	D	D
Seaweed	Gracalaria	Farming	Turbulent	50	Turbulent	50	Turbulent	50	E AF ⁵	E AF	E AF
Fish	Scopthalmus Maximus	Farming	Stable	100	Stable	100	Stable	100	D	D	D
Prawn	Penaeus Indicus	Farming	Growing	100	Growing	100	Growing	100	D	D	E

Source: Hepburn et al. (2001:25)

Key:

¹: s – Sample

²: E – Export

³: OMO – Other mariculture operations

⁴: D – Domestic

⁵: AF – Abalone feed

²¹ Perhaps a more representative [although highly tentative] description of the potential future market structure of formal mariculture firms producing output exclusively for domestic markets employing standardised factor inputs would be that of contestable markets, assuming current market entrance impediments are successfully removed. Browning & Browning (1989:420-421) define a contestable market as “one into which new firms may enter and produce under the same cost conditions as firms already operating within the market” where markets are characterised by ease of entry. The threat of entry leads existing firms to behave competitively even if the market is characterised by few firms. However, it is important to note that the general approach is criticised by “economists who argue external industry conditions may exert a greater influence in specifying industry entrance conditions, which accordingly determines industry performance irrespective of the number of firms operating in the market” (Browning & Browning, 1989:420).

3.3.3 Production

Total annual production in the year 2000 was a reported 550 tons, more than doubling to 1 124 tons by 2001. Based on industry forecasts, the domestic mariculture contingent will experience an annual average growth rate of 53% between the period 2001 to 2004 (Hepburn et al., 2001:21). Appendix 2 contains figure A2a presenting projected production output growth rates for the period 2001 - 2004 for each contingent. As figure 2 below illustrates, industry estimates total annual production to reach 2 788 tons by the year 2004, supplemented by an approximate total of 2 million and 7.8 million units of abalone and oyster spat respectively being produced for supply to other mariculture operations (Hepburn et al., 2001:19,25).

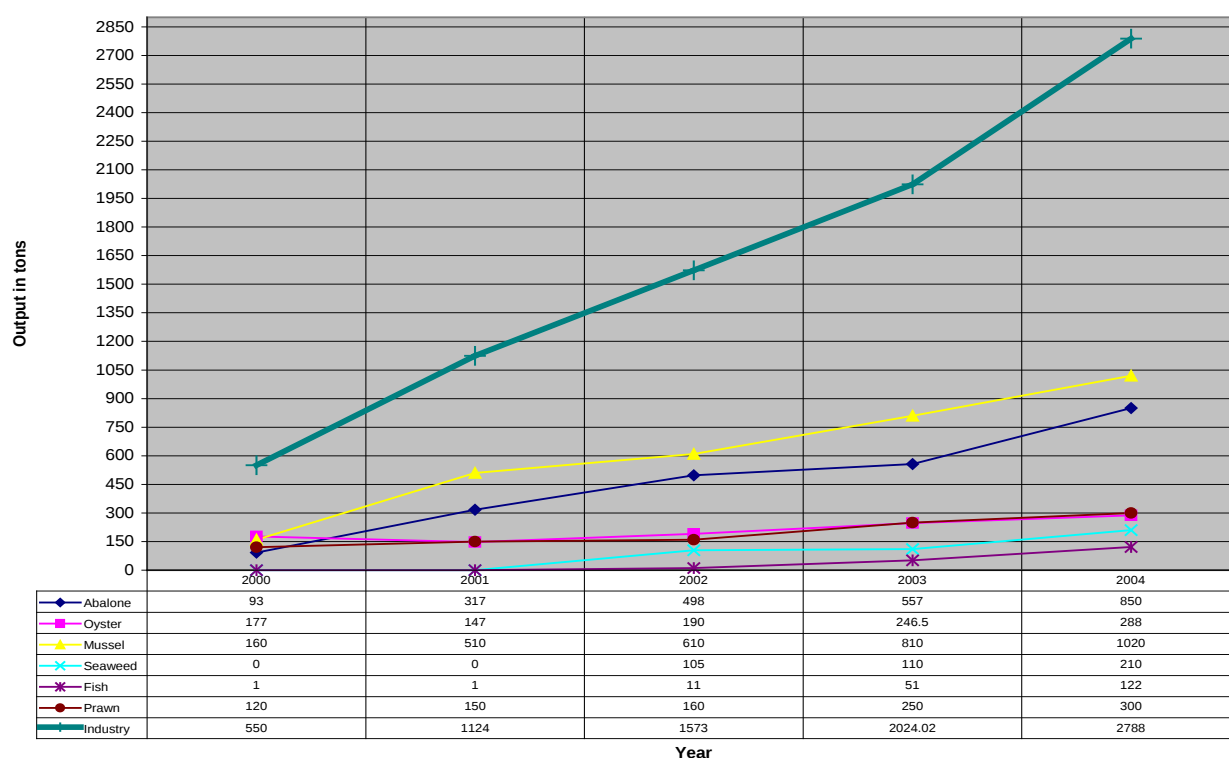


Figure 2: Current and projected production output

Source: Hepburn et al. (2001:20).

Note: Excludes spat production; includes projections provided by firms engaged with experimental production or classified as currently not operational.

A variety of production technologies are currently utilised in the domestic mariculture industry, where employment of specific cultivation techniques for grow-out purposes is generally ascribed to either maximisation of locality specific natural advantages or subject to individual firm budget constraints. Reid (1998:41) reports that the “South African cultured abalone industry uses farming techniques that are a combination of technology transfer from other parts of the world and local innovation”, successfully complemented by sustained “partnership with research institutions” (Sales & Britz, 2000:44)²². Abalone production is commonly associated with pump-ashore tanks,

²² Examples of local innovation include collaborative development of a nutritionally complete pellet feed to enhance juvenile abalone growth rates, as well as generating the possibility for abalone farming in kelp deficient areas (Reid, 1998:43).

although the use of longline cages is currently in an experimental stage. Longline raft culture methods are employed by both oyster and mussel farmers, with rack and tray methods being equally common among the remaining oyster producers. Seaweed is currently cultivated employing raft technology, although experimental shore-based techniques are under consideration. The contemporary infant fish farming contingent utilises pump-ashore tanks, whereas the long established prawn farming operation employs pond culture (Hepburn et al., 2001:19). Of particular interest is the current level of available capacity utilisation, where rather than merely serving as a rudimentary indicator of production frontier inefficiency or over-capitalisation, it provides an indication of the future production composition as industry expansion occurs. As figure 3 below depicts, the majority of the abalone and prawn contingents are operating at near maximum capacity. However oyster, mussel, seaweed and fish mariculture activities represent likely candidates for rapid future expansion, generating greater diversification within the industry. Indeed, industry-wide production expansion by the year 2006 is valued at a reported R159 020 000 with an estimated 463 new jobs being created (Hepburn et al., 2001:24). Appendix 2 contains table A2a presenting a detailed description of industry-projected Production expansion by operating activity over the period 2002-2006.

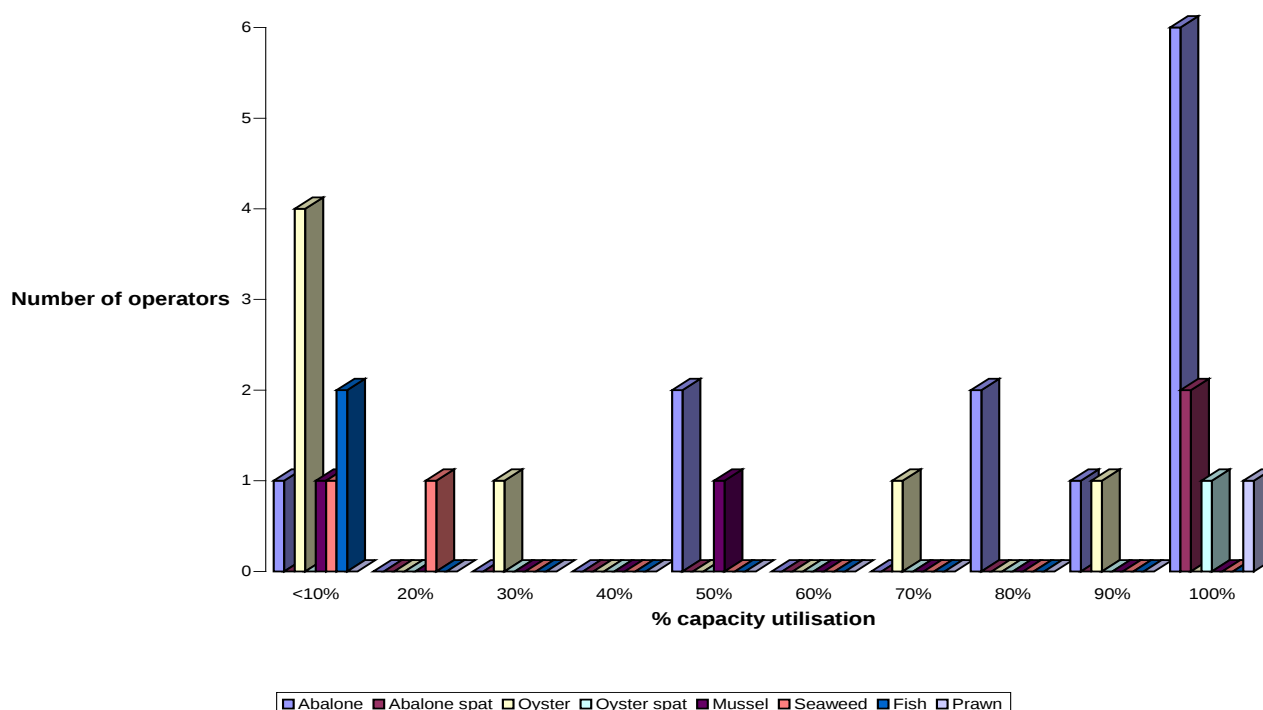


Figure 3: Current capacity utilisation

Source: Hepburn et al. (2001:22).

Note: Includes firms presently engaged with experimental production or classified as currently not operational.

3.3.4 Labour

At present, a total of 580 individuals are actively employed within the domestic commercial mariculture industry (Hepburn et al., 2001:27-28) where the majority are employed within the

established export-orientated abalone contingent. Appendix 2 contains table A2b presenting a detailed description of the current Labour profile for each production contingent of operational firms by skills class, monthly salary and race. As table 4 below demonstrates, the majority of those employed within the domestic industry are classified as labourers, although a significant proportion of the remaining labour force occupies skilled labour, middle services and professional categories, demonstrating the importance of a skilled human capital base.

Table 4: Employment by permit type, skills level & racial composition

Permit type	Labourer		Skilled Labourer		Middle services		Artisan		Professional	
	Number	% black	Number	% black	Number	% black	Number	% black	Number	% black
Abalone	260	98%	66	94%	48	50%	12	58%	32	0%
Oyster	100	100%	15	100%	2	0%	0	0%	15	0%
Mussel	13	100%	2	100%	1	0%	0	0%	1	0%
Seaweed	8	100%	0	0%	2	0%	0	0%	1	0%
Fish	2	100%	0	0%	0	0%	0	0%	0	0%
Total	383	99%	83	95%	53	45%	12	17%	49	0%

Source: Hepburn et al., (2001:27-28)

Note: Only firms classified as operational are included; summary data includes estimates by P.Britz; where firms engage in more than one operating activity but employ only one individual within a specified labour class, the employee has been grouped in the dominant operating activity to avoid double counting; prawn farming is excluded due to data shortages.

Income transformation by skills level demonstrates a high degree of racial-specific transformation at lower skill class levels, becoming negligible towards the upper spectrum of skill categories. This is most evident in the established oyster and mussel contingents where the nature of production does not require a high component of skilled labour. Nonetheless, as illustrated in table 5 below, the industry displays an average transformation index of 34.3% (Hepburn et al., 2001:31). This reflects both the contemporary status of the political economy [characterised by racially skewed human capital deficiencies] and the emergent nature of the currently technologically intensive formal mariculture industry.

Table 5: Income and skills transformation index

	Labour		Skilled labour		Middle services		Artisan		Professional	
	Black	White	Black	White	Black	White	Black	White	Black	White
Estimated employment per skills class [people]	379	4	79	4	24	29	2	10	0	49
Estimated total monthly income per skills class [R 000]	561	6	226.5	14	84	124.5	7	55	0	432.5
Average monthly income per skills class [Rand]	1 480	1 500	2 867	3 500	3 500	4 293	3 500	5 500	0	8 827
Racial composition of labour per skills class [%]	99	1	95	5	45	55	17	83	0	100
Income differential [Rand]	20		633		793		2 000		8 827	
Income differential [%]	1.4		22.0		22.7		57.1		100.0	
Transformational index per skills class [T _{SK} as %]	117		88.9		41.7		8.8		0	
Industry transformation index [T _{IND}] 34.3%										

Source: Hepburn et al. (2001:31)

The transformation index per skills group and for the industry as a whole is calculated as a weighted average of skills group and monthly income differentials illustrated in the following formulae.

$$T_{SK} = \%B_E(1-X)*DF$$

where: T_{sk} : transformational index for various skills classes [based on average monthly income]

$\%B_E$: percentage of black labour composition per skills class

X: income differential as a ratio of average black income to average white income

DF: demographic factor [1.2] to correct for the racial distribution of South Africa

and

$$T_{IND} = T_L(w1) + T_{SL}(w2) + T_{MS}(w3) + T_A(w4) + T_P(w5)$$

where: T_{IND} : transformational index for the industry [based on average monthly income]

$T_L, T_{SL}, T_{MS}, T_A, T_P$: transformational indexes per skills class

w1, w2, w3, w4, w5: weightings per skills class [0.1, 0.15, 0.17, 0.25, 0.33 respectively]

Skills weightings are based on the rationale that high skill classes demonstrate greater importance regarding mariculture production. In accordance, a greater number of black individuals possessing higher skill levels is required to ensure racial transformation within the industry.

However, in a pro-active attempt to establish skills-based human capital, the majority of operational agents possessed skills development programmes available to employees, specifically focusing on practical on-farm training, and presently including 227 participants (Hepburn et al., 2001:18,32). Appendix 2 contains table A2c presenting a detailed analysis of labour development, including competencies taught in skills development programmes currently offered by operational firms to employees. To further expand the human capital base in both scope and depth, the majority of industry accepted the proposed formulation of an accredited formal mariculture qualification based on industry-driven needs. Support for the initiative was given by abalone, mussel, seaweed and prawn contingents. Respondents reported that such a programme would contribute to enhancing skilled staff availability essential for industry development, and displayed willingness to assist in the establishment of a practically orientated knowledge-base. The initiative was rejected by oyster and fish farming operators, who argued that on-farm training was sufficient for their activities (Hepburn et al., 2001:18).

As figure 4 presented on the following page illustrates, projected employment trajectories based on industry expansion forecasts (Hepburn et al., 2001:29) fluctuate among the various contingents

due to their different time horizons for realising expansion activities. Nonetheless, aggregation translates into a strong industry growth trend displaying rapid forecasted growth for abalone and oyster producers between the period 2002 – 2003, leading to the potential employment of 1 061 individuals by the year 2006.

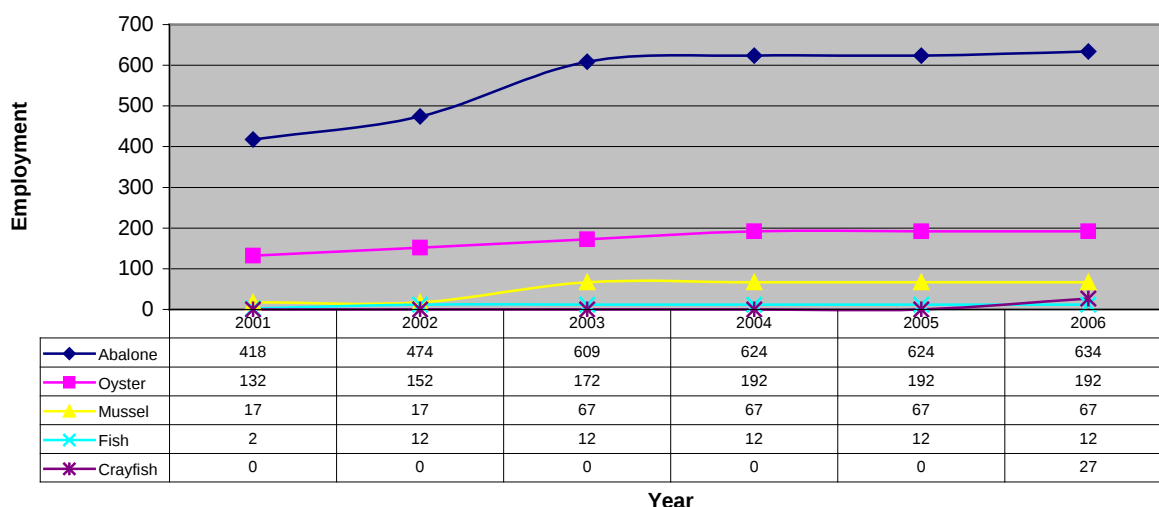


Figure 4: Projected employment by permit type

Source: Hepburn et al. (2001:29)

3.4 Industry Perceptions

3.4.1 Operating environment

The majority of initial investment was sourced from domestic investment/loans and private venture capital. Appendix 2 contains table A2d presenting initial operation constraints as well as original and current investment sources by operating category. The notable absence of both foreign financial aid and specifically foreign direct investment [consistent with contemporary macro-economic policy stance] in a high growth global industry raises concerns pertaining to the perceived risk profile of South African mariculture activities, and inadequate resource assignment by government to actively promote mariculture development. Difficulty in obtaining financial capital by the commercial private sector industry reflects formal financial institutional rigidities constraining establishment of new operations, and presenting further important implications for realisation of envisioned mariculture development initiatives. Although technological and skilled labour constraints are production modality and species specific, the majority of operators [with the exception of oyster producers] reported difficulty in securing technology and adequate human capital (Hepburn et al., 2001:39,41). Difficulty in securing technology relates to acquisition of physical productive technology that is suitable for local mariculture cultivation. The process often involves adoption of foreign knowledge and technology that undergoes local innovation to satisfy situational specific characteristics of the operating activity. In accordance, Chapter 5 is dedicated

to a systematic development economic treatment regarding aspects of promoting accessible financial capital, addressing human capital deficiencies and collaborative technological development within various organisational capacity building arrangements as they pertain to realising the inherent growth potential of both formal and socio-economic orientated development initiatives of the domestic mariculture industry.

Industry concerns regarding institutional bureaucratic-related deficiencies within MCM is evident in unnecessarily lengthy decision-making processes regarding permit approval. Furthermore, lack of feedback as potential permits are processed generates perceptions of MCM disinterest, and inevitably builds animosity between industry and MCM instead of synthesising collaborative beneficial relationships (Hepburn et al., 2001:40,42). As a result of permit delays, industry also perceives the duration of export permit validity to be insufficient (Hepburn et al., 2001:42). As such, a thematic categorisation of industry recommendations for alleviating the current permitting situation is presented in figure 5 below. As can be seen, support exists for the establishment of a semi-autonomous 1-stop permitting institution, compliant with MCM permitting criteria but operating independently from existing bureaucratic organisational arrangements. However, consensus regarding suitable funding methods remains undefined.

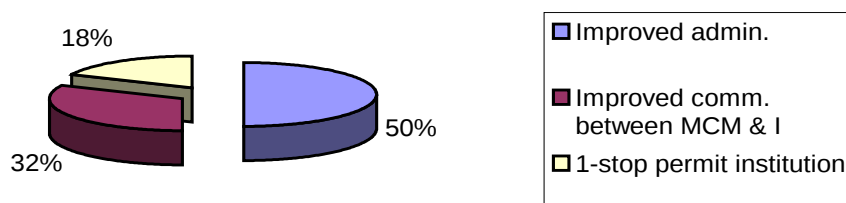


Figure 5: Industry recommendations – permitting

Source: Hepburn et al. (2001:43)

Industry recommendations were extended to spheres where government should assume a more pro-active role in a bid to ensure progressive development within the industry. As figure 6 below demonstrates, the majority of respondents called for enhancement of current institutional capacity via improved administrative support, followed by increased involvement in technology development and transfer activities. In terms of production specific recommendations, certain respondents from abalone farming and ranching activities recommended greater government facilitation in the establishment of international partnerships. Oyster farmers called for import control and the prawn contingent advocated a more prominent government role in activities relating to disease control.

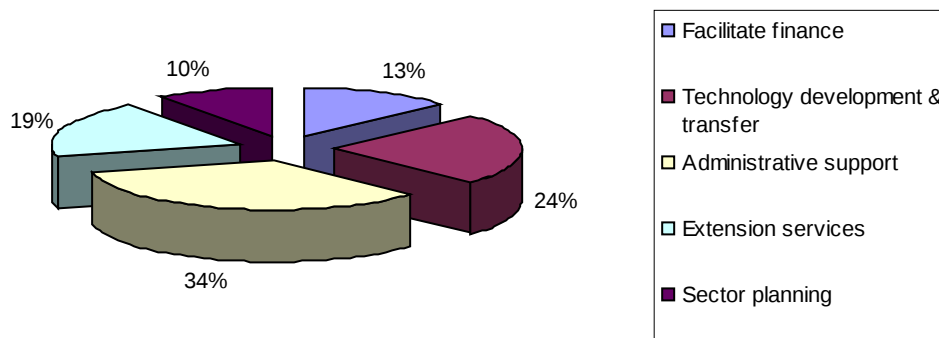


Figure 6: Industry recommendations - government roles
Source: Hepburn et al. (2001:44)

Although limited support was given for the development of industry planning, this represents a fundamental developmental issue for dynamically integrating identified economic-institutional development variables, as well as guiding progressive expansion by co-ordinating future strategic development actions. Reassuringly, MCM strongly recognises the “need for constructive and sustainable development of mariculture in the long-term ... [based on the development of a] national sector plan [to be] integrated with national policies on aquaculture and coastal management” (MCM, 1999c: 34-35). In accordance, Chapter 6 is devoted to economic planning issues consistent with current MCM objectives regarding formulation of an integrated planning framework for realising the inherent growth potential of the domestic mariculture industry.

3.4.2 CPP relationships

As indicated in Chapter 1, CPP relationships are identified by policy as being vital to achieving successful utilisation of mariculture development initiatives to catalyse economic growth and alleviate poverty amongst previously marginalised rural coastal localities. Indeed, establishment of the Community Public Private Partnership [CPPP] programme, “designed to ensure the pattern of [economic] growth benefits poor communities ... [by] focusing on the revitalisation of the rural economy through targeted investment facilitation” (Mahlati, 1999:3-4), bears testament to the dedicated effort being made to promote CPP relations. Based on findings from the baseline study, the majority of respondents claimed they had no prior extensive knowledge of CPP relationships and had not been actively encouraged by government to participate (Hepburn et al., 2001:34). Industry appears potentially willing to devote private resources to the establishment of such initiatives via contracted-out production satellites to suitably skilled candidates. Derivatives of envisioned development activities may encapsulate Thompson’s (1973:24) notion of forward attached satellite firms designating “entities directly associated with a larger centre firm by contract”. Figures 7a – 7h below demonstrate potential areas of support that each contingent is potentially able to contribute towards the realisation of CPP initiatives. It is imperative to acknowledge that data reported is by no means binding and merely serves as an indicator as to industries’ current support for engaging in CPP relationships.

Figure 7a: Abalone [farming & ranching]

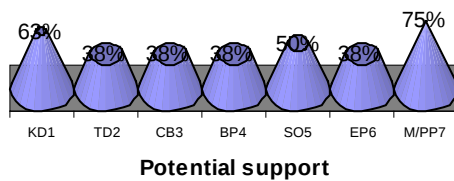


Figure 7b: Abalone [spat]

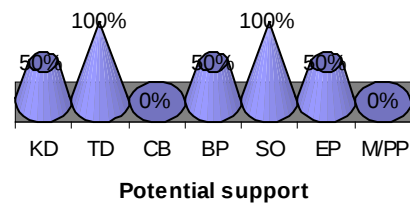


Figure 7c: Oyster [farming]

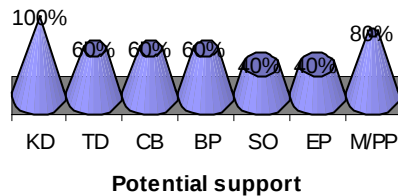


Figure 7d: Oyster [spat]

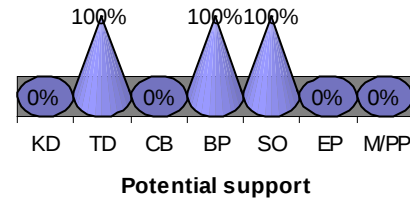


Figure 7e: Mussel [farming]

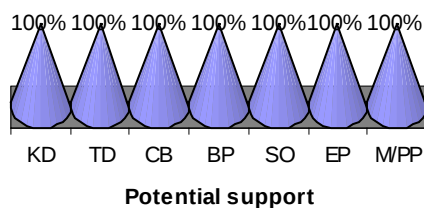


Figure 7f: Seaweed [farming]

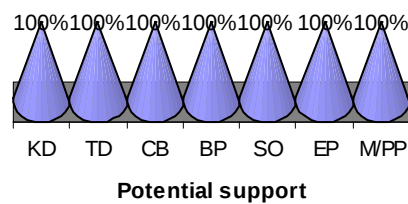


Figure 7g: Fish [farming]

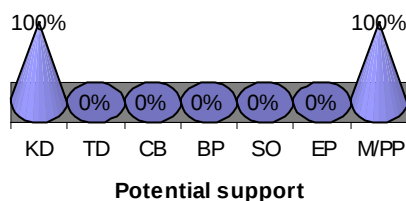


Figure 7h: Prawn [farming]

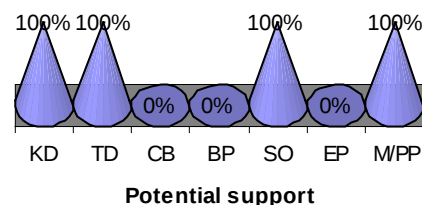


Figure 7: Potential private sector CPP support
Source: Hepburn et al. (2001:37-38)

Key:

- 1: KD - Knowledge dissemination
- 2: TD - Technological diffusion
- 3: CB - Capacity building
- 4: BP - Business planning
- 5: SO - Supply of organisms
- 6: EP - Equipment provision
- 7: M/PP - Market/processing partnerships

Although there will undoubtedly be variation regarding contractual obligations and complexity, creation of development satellite franchise coalitions attached to formal industry parent operations effectively establishes “hybrid co-operative organisational modes blending market forces with elements of internal organisation” (Bonus, 1986:332). In accordance, such arrangements afford franchisees an opportunity “to harvest the benefits of collective organisation by sharing the productive resource of the brand’s reputation ... [and] by eschewing vertical integration, they have the benefits of independent operation residing in efficient use of peripheral idiosyncratic

knowledge” (Bonus, 1986:333). However, feasible economic incentives need to be presented by government and clearly articulated within a holistic development framework to encourage initiative promotion (Hepburn et al., 2001:34). In accordance, Appendix 2 contains Table A2e presenting potential willingness to engage in CPP initiatives by operating activity contingent upon an economic incentive provision based framework.

3.5 Sustainable Development

Based on a response rate of 89%, only 29% of currently operational firms reported the conduction of an Environmental Impact Assessment [EIA] prior to commencing activities (Hepburn et al., 2001:26). This is despite provisions 3.4 [environmental impact reports] and 3.7 [water discharge] of “Application to Engage in Mariculture” in terms of sections 13 and 18 of the MLRA of 1998 (MCM, 1999c:72-73). However, the attention deserved by issues pertaining to sustainable development cannot be fully explored due to the variety of issues being examined within the discourse and space constraints. The primary objective of the following overview is to thus provide a key-note address to environmental sustainability and a brief economic prelude beyond ‘internalizing the externality’. Attention is also given to the current status of mechanisms designed to ensure environmental sustainability of mariculture expansion within the domestic industry.

The non-linear and potentially irreversible impact of economic activity on surrounding environment resilience capacity necessitates the adoption of a cautionary approach when promoting specific forms of economic development to ensure sustainability. Ecosystem non-linearity implies that ecological change is not gradual or continuous in response to incremental pollution increases. As such, Rao (2000:73) argues that non-linearity in ecosystems leads to the occurrence of unpredictable disproportionate behaviour. This is because “periodic and random small changes can propagate disturbances dramatically, and regions of stable relationships collapse as slow processes accumulate and move the system from one set of controlling mechanisms to another” (Rao, 2000:73). It is acknowledged that perspectives on sustainability are reflective of paradigmatic stances. These progressively range along a continuum - from the neo-classical economic perspective of sustainability, based on technical progress and substitution possibilities ensuring non-declining human welfare; to socio-economic quantitative input-output restrictions. Finally, the human ecology approach considers the multiple effects of human action in relation to ecological features (Roa, 2000:84)²³.

²³ Interestingly, neo-classical technical progress arguments have been tentatively challenged based on quantitative evidence provided by the Environmental Impact Index. The index analyses the extent environmental impacts have been induced by post-WW2 technology transformation accompanying economic growth of the American economy (Commoner, 1971:340). Commoner (1971:341) argues the study demonstrates “new technology has an appreciably greater environmental impact than the technology which it has displaced, and the post-war technological transformation of productive activities is the chief reason for the present environmental crisis”

The following conceptualization of sustainable development is adopted to reflect the nature of current mariculture concerns pertaining to potential coastal environmental degradation for competing users. This includes guaranteeing subsistence fisher food security needs and natural aesthetics-based industries such as tourism. Indeed, within a general framework establishment of national recreational areas places greater emphasis on “questions of justification, location and operation of water development projects” (Knetsch & Davis, 1966:450-451). As such, sustainable development is defined as “a pattern of social and structural transformation which optimizes economic and social benefits available in the present without jeopardizing the likely potential for similar benefits in the future” (Gilbert & Braat, 1991:261).

Within the global sphere, Sorgeloos (2000:1) reports use of current technological practices and business methods to rapidly expand aquaculture production may not be desirable. Without adequate safeguards, mariculture may affect the environment in a number of ways. These include biological pollution through escaped fish that may spread disease to wild stocks, organic pollutants and eutrophication via nutrient loading from discharged fish waste, and chemical pollution from antibiotics and pesticides (Goldburg et al., 2002:i). The decision to expand aquaculture production is thus a complex one where the “risks of environmental and human health problems need to be weighed against achieving a more cautious rise in production which is, in the longer term, sustainable” (Sorgeloos, 2000:1). Consequently, there has been movement towards ecological aquaculture. This incorporates the “technical aspects of ecological methods and systems ecology to aquaculture [with] community development and concerns for the wider social, economic and environmental contexts of aquaculture” (Costa-Pierce, 2002_a:1). Hecht & Britz (1992_b:339, 341) report that “consensus of international opinion is that the impact of mariculture operation are usually highly localized ... [and] if practised along environmentally acceptable lines, mariculture forms a compatible component of the ecosystem”. Indeed, “clear linkages between aquaculture and the environment must be created and fostered, and the complementary roles of aquaculture in contributing to environmental sustainability, rehabilitation and enhancement must be considered” (Costa-Pierce, 2002_a:1). As such, Sorgeloos (2000:3) points to the future importance of extractive mariculture for anthropogenic nutrient recycling, currently being researched in Europe. Seaweed and mollusc farming [where final product is not for human consumption] are used for general coastal water purification or nutrient recycling by removing waste nitrogen and phosphorus released by aquaculture farms. Indeed, one abalone producer the researcher visited used seaweed tanks to remove impurities before discharging water.

However, measures to prevent environmental degradation become compounded by non-pecuniary technological externalities associated with formal mariculture industry production techniques. This may occur such that private costs of reducing harmful effluent discharge and the limited overall impact of individual regulation compliance on improving social welfare motivates non-compliant

free-rider behaviour. In accordance, institutionally generated measures are required to correct unregulated market outcomes (Davis & Kamien, 1969:119), as economic decisions that “increase or decrease the degree of environmental damage usually involve effects that are not observable in markets” (Johansson, 1993:111). When broad macro-social futurity welfare goals are not considered “state intervention is unnecessary to secure optimum resource allocation ... when parties are willing and able to negotiate to their mutual advantage” (Turvey, 1963:188). However, this perspective is non-applicable in light of recent coastal legislative reformulation which seeks to preserve sustainable integrated future coastal development through the adoption of a coordinated managerial approach. Accordingly Dales (1968_a:180) aptly notes “economically and socially the question is which set of interests should prevail, and what accommodation should be made among the various interests concerned”.

Progressive developments have enabled ascription of monetary valuations to environmental damage and quality enabling conduction of tangible cost-benefit measurement analysis utilizing a variety of economically formulated methods. However, it is important to recognize Johansson’s (1993:131) findings that “studies in which different methods are used ... report unexpectedly large differences generated by different methods. Therefore, further work in the comparison of methods is needed before ultimate conclusions can be drawn regarding their relative reliability”. The crucial issue remains one of “determining just how much of the externality is desirable” once natural assimilative capacity is jeopardized, allowing implementation of an appropriate feasible corrective action policy (Davis & Kamien, 1969:121). Of paramount importance is the amount of available information pertaining to the potential environmental impact regarding possible expansion of the domestic mariculture industry. Although generalizing, Dasgupta (1993:44) argues knowledge of ecological processes and economic environmental impacts is, “when scrutinized, merely anecdotal ... [due to] the implied absence of private incentives for obtaining information about resource stocks ... [as] when they are free, there is absolutely no incentive to economize their use”.

Regionalisation and zoning solutions for water utilising economic activities offers a potential coastal development policy recourse (Dales, 1968_b:237). However, establishment of a regional dimension to environmental-economic areas not only influences the emergent spatial structure of economic activity, but represents institutional challenges regarding environmental policy. Ewringmann & Hansmeyer (1980: 154-155) report that regionalisation of environmental policy is suitable when external effects of environmental utilization are regionally concentrated, or when a large number of locality specific ecological criteria determine functional differentiation of regions. Such instances may become reflective of the mariculture industry, particularly as mariculture expands and assumes a greater role in coastal development. Although such a regional approach conforms with notions that “[natural] resource policies are inherently national while environmental policies are regional or local [in focus]” (Scott, 1980: 209), the process of policy formation is not so

easily defined. Siebert (1980:7) notes that regionalised environmental policy “raises the question as to [whether] environmental policy should be undertaken by autonomous regional authorities or by the national government”. Indeed, Ewringmann & Hansmeyer (1980: 153-154) reject delegation of political competence to the regional level due to the “insolvable problems of co-ordination and inter-regional diffusion of pollutants”. At present, environmental scoping, involving effluent release by shore-based mariculture operations, is channeled through local and provincial authorities although MCM has jurisdiction over the quantity and quality of effluent released. Attention is being directed at streamlining the current environmental process so that it can be monitored by a single authority (MCM), although it is recognized this will be a long term objective (MCM, 1999_c:98).

Consistent with concerns relating to environmental sustainability of economic activity, a number of regulatory devices and facilitatory mechanisms are being developed to ensure development of the domestic mariculture industry does not violate long term coastal integrity. As such, there is active development of a Geographic Information System [GIS] to identify suitable areas for mariculture. This is envisioned to “progress to a stage that can assist with the planning of future mariculture development” (MCM, 1999_a:7). As previously mentioned, sections 13 and 18 of the MLRA establish provision for possible conduction of an EIA and water discharge report. Regulations have currently been drafted in terms of the MLRA building on previous legislation including the Environment Conservation Act 73 of 1989, the Sea Shore Act 21 of 1935 and the Animal Diseases Act 35 of 1984 to address specific mariculture issues. These include aspects such as application requirements, potential environmental assessments, lease agreements for site selection and precautionary use of genetically modified organisms (MCM, 1999_a:1-2). Finally, MCM has the present expertise and knowledge to cater for environmental issues associated with mariculture activities. This includes the capacity for using dynamic modelling to establish predictive outcomes for multi-usage scenarios, and develop an understanding of potential environmental impacts associated with mariculture (MCM, 1999_c:98). Adoption of the aforementioned legal measures and the environmental research capacity within MCM should ensure that the domestic mariculture industry expands along an environmentally sustainable development trajectory.

3.6 Concluding Remarks

Results generated by the interim 2001 National Mariculture Baseline Survey report indicate the industry is expected to display positive growth in cultivated output over the short to medium term. Employment opportunities should also be generated subject to expansion of existing firms activities and operationalisation of new entrants. However, it is important to recognise further skills development and employment of qualified black labour is required for transformation within higher skills categories to be attained. Diversification in the industry is becoming evident through the

activities of new entrants, threshold commercialisation of new species and imminent attainment of higher levels of capacity utilisation by non-abalone producing firms. The industry shows an even spread regarding market destination of final product. High-values species [abalone and recently prawns] or species requiring presently unavailable value-added [seaweed] are exported and, lower value produce is sold on stable domestic markets although potential exists for future export. Issues of sustainability regarding the impact of mariculture activities on the coastal environment form an important part of future industry development. Formulation of applicable legislation, creation of a GIS system and the scientific research capacity within MCM suggest the development trajectory of the industry will occur along sustainable lines to preserve long term coastal integrity.

The commercial mariculture contingent displays a high level of innovative capacity that is required for adaptation of a variety of foreign cultivation methods to domestic environments and locality specific constraints. Instances of collaboration between industry, research institutions and MCM, particularly in areas of disease management, have generated favourable outcomes. Furthermore, industry demonstrates a general willingness to occupy a facilitatory role in collaborative CPP orientated production satellite arrangements, providing commercial grounding for envisioned mariculture development initiatives. However, a number of variables currently hindering growth include financial capital constraints, skills-orientated human capital deficiencies and non-availability of local technology designed specifically for local cultivation environments. Furthermore, the persistence of inappropriate bureaucratic organisational forms ill-equipped for processing applications and permitting requirements represent additional institutional constraints.

In accordance, the following chapters examine how these barriers can be potentially overcome, thereby attempting to resolve concerns that have emerged from the baseline. As such, issues of financial capital availability, skills development and creation of a formal knowledge base, partnership technology development and dissemination agreements, as well as relevant institutional components are discussed.

PART 2: Integrated Development Aspects for the South African Mariculture Industry

The following section seeks to provide holistic integrated treatment of economic and institutional variables requiring synthesis within a responsive practically implementable planning framework. In accordance, Chapter 4 focuses attention upon institutional aspects of property rights and transaction costs that influence current and potential future growth trajectories of the domestic mariculture industry. Insight is provided into the coercive behaviour-directing character of rights; the need for clearly defined secure long-term mariculture rights; and the social welfare importance of property right assignments in expanding dynamic equality in opportunity associated with potential catalytic development mariculture activities. Furthermore, presence of positive transaction costs and distorting asymmetric information arising from poorly structured communication mechanisms present further challenges for the establishment of an integrated development framework.

Chapter 5 concentrates attention on integrated development of the domestic mariculture industry. This is done through synthesis of pertinent aspects sourced from established development economic principles. While a multitude of factors are associated with the economic development process, attention is focused on pertinent inter-related aspects of financial capital, human capital and technological development. It is argued that competitively priced capital provided through an industry-specific development bank is essential in promoting further industry growth. Recognition of human capital deficiencies requires formal education linked to on-the-job practical skills acquisition orientated programmes operating within collaborative public-private partnerships. Furthermore, the need for establishing organisational arrangements promoting collaborative research for both commercial technology application and collaborative time-space specific appropriate technology development and dissemination is acknowledged. Finally, various conceptualizations of envisioned socio-economic mariculture development initiatives are discussed.

Chapter 6's treatment of planning perspectives focuses on broad conceptualisations and pertinent planning aspects as they relate in contributing to the establishment of a holistic integrated framework for realising the inherent growth potential of the domestic mariculture industry. The chapter seeks to illuminate the need for time horizon consolidation, ensuring that the iterative process of planning remains current and reflective of contemporary objectives. Furthermore, attention is focused on reconciling MCM's current centralised objective orientated planning approach with decentralised regional planning perspectives. This should afford the opportunity for greater participative stakeholder involvement. Finally measures aimed at increasing harmonisation between planning implementation and industry responsiveness are briefly reviewed.

CHAPTER 4: INSTITUTIONAL ASPECTS

4.1 Introduction

The following chapter seeks to focus attention upon institutional aspects of property rights and transaction costs that influence current and potential future growth trajectories of the domestic mariculture industry. Indeed, Furubotn (1990:227) argues theoretical concepts associated with property rights and transaction cost models “offers a generally coherent interpretation of the interrelations between institutional structure and economic behaviour”²⁴. The rationale for doing so is based on the importance of institutional variables within the development process, as introduced in Chapter 2. For purposes of terminological clarity, an institution is defined as “a social organisation which through the operation of tradition, custom or legal constraint, tends to create durable and routinised patterns of behaviour” (Hodgson, 1989:10). Institutions thus consist of “a set of formal [laws, contracts] and informal [traditions, value systems] rules of conduct that facilitate, co-ordinate or govern relationships between individuals or groups” (Kherallah & Kirsten, 2001:4). Property rights are “the rights of individuals to the use, income, and transferability of resources” (De Alessi, 1990:47) where the basic property right is “the legal power to withhold something from the use of others” (Chamberlain, 1963: 71).

Contemporary systematic treatment of property right and transaction cost issues often leads to the inevitable inclusion of the Coase Theorem and its relevance in “decentralised decision-making” (Schweizer, 1988:291). Briefly stated, the theorem posits the “proper assignment of rights to any good, even if externalities are present, will allow bargaining between the affected parties such that an efficient solution can be obtained, regardless of which party is assigned those rights” (Callan & Thomas, 1996:96). Randall (1978:10) demonstrates the limited applicability of employing the theorem in environmental policy, specifically where environmental resources exhibit public goods properties of non-rival in consumption and non-excludable in use (Hyman, 1996:124-125). However, concern must also be paid to the necessary implications of feasible allocative neutrality. As such, transactions are required to be costless, information perfect, limited parties affected, and damages quantifiable (Callan & Thomas, 1996:99). When these assumptions are evaluated against prevailing economic reality, the Coase Theorem becomes analogous with a curious ‘if pigs could fly’ hypothesis. The existence of positive transaction costs implies that some property rights will not be fully defined, allocated and enforced (De Alessi, 1990:47). In accordance, the analysis below provides insight into the nature of positive transaction costs; the coercive behaviour-directing character of rights; and the social welfare importance of property right assignments in expanding dynamic equality in opportunity associated with potential catalytic development mariculture activities.

²⁴ Dales (1968a:172) argues “property rights form interfaces between law and several social sciences, especially economics”.

4.2 Property Rights

4.2.1 Introduction

The composition, structure and nature of property rights is regarded as an essential variable in the development process. Property rights institutions, ranging from formal arrangements [legislation] to informal conventions and customs, critically affect incentives for decision-making regarding resource use and hence both economic behaviour and performance (Libecap, 1989:214). Altering property rights structures allows an “individual's opportunity set to be enhanced by the assignment of a particular beneficial right” (Dragun, 1983:669). However, the inevitable reciprocal externality imposed on non-right holders necessitates the pervading issue to become one of allocating rights to specific interest groups based upon the prevailing macro-social agenda. While it is not the primary aim of the discourse to directly influence the delineation of specific property right allocations, the following section seeks to draw attention to the constituency and importance of well-defined property rights, specifically when considering the creation of a holistic domestic mariculture development framework.

4.2.2 Mutual coercion

As early as Adams, law has been recommended as the best and most readily available means for counteracting the equally destructive forces of indiscriminate state intervention and unrestricted liberal private enterprise (Dorfman, 1963: 31). This leads Adams (cited in Dorfman, 1963:31) to declare that “[as] the industrial movement of men are bound by the liberties of law and custom, and the industrial weavings of society is largely determined by its legal structure ... every change in law means a modification of rights; and when familiar rights are changed or new duties imposed, the plan of action for all members of society is adjusted to a new idea”.

From a traditional institutional perspective, Commons' (in Chamberlain, 1963:71) concept of collective action provides a solid theoretical accord of mutual coercion. Resource scarcity causes an inherent conflict of interest amongst society's constituent members. This leads to socially self-imposed collective action via the establishment of property rights, as society seeks to organise and structurally regulate itself through specific forms of social relationships. It is important to note that collective action refers not only to the activities of organisations, but includes state and common law as well as “the total bundle of patterns of conduct which a society sanctions or compels of its members” (Chamberlain, 1963:71-72). Collective action is thus regarded as structuring economic relations between individuals in two manners. This can be achieved directly through the creation of working rules governing bargaining relations via the establishment of permissible limits of coercion and duress, which economic agents may impose on one another. Alternatively, it may be done indirectly through the sanction of rationing devices for the allocation of scarce resources left undistributed by the bargaining process (Chamberlain, 1963:75).

Building upon this framework, Dragun (1983: 672) elucidates that individual choice should thus be regarded as volitional in that inter-dependent social and economic criteria establish an economic agents opportunity set, restricting individual choice to a particular range of feasible options. In this context, mutual coercion becomes “the impact of the behaviour and choices of others upon the structure or array of one’s opportunity set” (Dragun, 1983: 668). In accordance, certain individuals or organisational bodies occupy more favourable positions, enabling utilisation of available power to influence government and direct law within varying degrees. Indeed, economic rules are formulated by political decision-making which specify and enforce property rights and individual contracts (North, 1989_a:254). Although general concern is raised by Weingast (1989:261) that changes in political governance typically followed by ensuing changes in legislation adversely affect continued implementation of previously formed policies, legislative reformulation and organisational restructuring has provided a holistic facilitatory coastal development paradigm. As such, MCM, through assignment by DEAT as a government department tasked with mariculture development, possesses significant influence over the generation of equality in opportunity and potential growth trajectories of the mariculture industry. This is possible by being able to not only influence right allocations for potential socio-economic mariculture development activities, but alter unnecessarily complex permitting processes for the formal domestic mariculture contingent in an attempt to enhance transactional efficiency. Indeed, as De Alessi (1990:47) notes, “opportunities for gain arise from the development and adoption of new contractual arrangements permitted by existing institutions ... or the development and adoption of new institutions ... which modify the set of permissible contracts”. Furthermore, Libecap (1989:215) comments “history shows property institutions are not mere respondents to broad economic [or market] forces, but they shape the path of economic progress”.

4.2.3 Importance of property rights

From a conceptual stance, coercion may be perceived as carrying a negative stigma when evaluated against idealistic principles of autonomy involving freedom of choice and liberty. However, Randall (1978:4) purports that institutionalised collective action organised within a specific legal framework liberates economic agents by performing two fundamental tasks. Firstly, relieving the need to endlessly make and enforce specific agreements. Secondly, providing secure rights while simultaneously placing limitations on the actions of others. These notions are supported by Rutherford (1983:723), arguing that collective action “may also involve the liberation and expansion of individual action ... [enabling] the achievement of goals that require the organisation and control of others”. As such, liberty is reduced to the mere “absence of restraint or compulsion” (Dugger, 1980_b:59), and assumes a highly individualistic trait. However, it is important to note that because “institutions express a society’s value system and give it effect in the form of working rules [law]”, its stability is dependent upon “be[ing] broadly consistent with the ethical values of the society” (Randall, 1978:12). Furthermore, Libecap (1989:218) adds “whether or not

an individual will support a new property arrangement at any point in time depends on his expected relative wealth position under the status quo, compared with that under the proposed change”.

Collective social action essentially establishes reciprocal property rights, effectively “support[ing] and protect[ing] individuals as they exercise their liberty” (Dugger, 1980_b:51) by regulating the nature of others’ activities. As such, well-defined perpetually evolving property rights enable the protection and dynamic expansion of equality in opportunity. From an economic developmental perspective in general, and growth of the domestic mariculture industry in specific, dynamically expanding equality in opportunity becomes essential when adopting an evolutionary view of unleashing the growth and socio-economic welfare potential of mariculture activities.

However, it is important to recognise that the conceptual importance of property rights is extended beyond generic notions of legally enforceable ownership of a physical or intellectual entity consequently incorporating property “as incorporeal and even intangible” (Dugger, 1980_b:47). Property rights incorporate the flexible right of transfer “induce[ing] the owner to operate with an infinite planning horizon ... [enhancing] the efficient allocation of resources over time” (Furubotn & Richter, 1991:6). Indeed, the classification of an asset or commodity is defined by both its technical properties and the particular set of legal restrictions governing its use and exchange. As such, the right of ownership is not an unrestricted right in that its exclusivity is limited by legal restrictions upon its use, where “attenuation implies a shrinkage of economic options for the owner” (Furubotn & Richter, 1991:6), effectively reducing the asset’s value. As such, both legal ownership of a physical entity and the corresponding legal restrictions sanctioned by law become essential components in factors of production within any given form of economic activity. Recognition of such aspects becomes essential for envisioned development of small and micro-scale mariculture activities amongst previously marginalised coastal communities. This is specifically important if virtuous empowerment is to occur in situations where land allocated for mariculture activities is communal in nature or could potentially compete with alternative viable development-orientated economic activities.

Another important property-rights orientated variable, illustrated by Gordon’s (1954) extreme open-entry case becomes evident when considering the nature of common pool valuable resources applicable to potential socio-economic mariculture development programmes. It is obvious that Gordon’s model represents a theoretical extreme, and relevance will be determined by the ultimate structure of such welfare enhancement programmes involving varying degrees of individual ownership within a collective community-orientated initiative. Nonetheless, the approach can be adopted in “any setting where property rights are not fully defined over the various margins of production” (Libecap, 1989:217).

Following Gordon's rationale, individuals are attracted to valuable resources, provided their marginal costs of access and use is less than or equal to average returns for all parties from resource use. However, these conditions lead to wasteful decisions on three accounts. Firstly, non-assigned resource property rights imply myopic time horizon-constrained individual production decisions where user production costs and long-term investment is ignored, leading to exploitation. Secondly, competition for control compounded by uncertainty limits the emergence of markets for future exchange and reallocation of resources to higher-value ones. Finally, uncertainty and limited control may divert labour and capital from productive inputs to predatory or defensive activities (Libecap, 1989:217).

Samuels (1971_a:440) argues that only once property rights have been effectively established can "market forces emerge and take on shape". Libecap (1989:217) states that the activities of market forces in the presence of established property rights become beneficial when technological change occurs reducing production costs. Relative price changes raising returns to ownership create incentives to contract in a bid to increase exclusivity in resource control, aiding to establish more complete and precise property rights. Furthermore, Furubotn & Richter (1991:7) note that the establishment and transfer of well-defined property rights enable the feasible use of incentives "under circumstances of norm-abiding behaviour". Indeed, strategic development-orientated government intervention coupled with established legislative guiding principles operating within a structure of clearly defined property rights may catalyse the generation of "sequential externalities [generated by initial entrants] ... inducing ongoing entry [leading to] ... a proliferation of small and medium enterprises [which] expands competition, transactional efficiency and markets ... and progressive gains in organisational capabilities" (Biggs & Levy, 1991:368). As such, fundamental principles of property rights as well as the intricacies of legal-economic systems not only become essential foundational structural determinants of the operation and rationing of the market mechanism within the mariculture economic-institutional system, but also exert considerable influence in establishing potential future growth trajectories.

In accordance, the notion of futurity where legal possession guided by anticipated actual use and enforced by a property right, endows coastal land potentially designated for mariculture activities with publicly recognised protection via the exclusion of non-right holders. It is important to recognise that negotiations seeking to place a present value on the legal claim of expected future values are relatively inconsequential with respect to the immediate production of goods due to limited time frames elapsing between transfer of title and consumption, but the principle assumes greater importance "with respect to negotiations for the present control of future production or production facilities" (Chamberlain, 1963:82). Well-defined property rights thus become highly pertinent with regard to allocation of coastal land for mariculture activities, whether for private sector use or CPP initiatives to promote realisation of socio-economic development along

marginalised coastal localities. Furthermore, the need for clearly defined transferable long-term property right structures has been identified by both MCM and industry as an instrumental variable in promoting growth, leading to a review of current annual renewal periods to be replaced by application for a 15-year right (MCM, 1999c:79)²⁵. As Libecap (1989:215) aptly states, “the heart of the contracting problem is devising politically acceptable allocation mechanisms to assign the gains from institutional change, while maintaining its production advantages”.

4.3 Transaction Costs and Asymmetric Information

4.3.1 Introduction

The market is essentially a co-ordinating and structuring mechanism where individual and subjective preferences relate to each other allowing exchange transactions to occur (Hodgson, 1989:177,180). However, it is important to note that non-market exchange in the form of relational contracts may also occur where habitually renewed contracts do not consider alternatively available market substitutes (Hodgson, 1989:177). Transaction costs are central to the orthodoxy-institutional dichotomy regarding perspectives relating to market functioning. This is based on notions regarding the perceived restrictive nature of institutions, which are seen as constraining ‘free’ market resource mobility and competition. Indeed, pure market economy advocates argue that institutions should be confined to “creating property rights promoting unrestricted voluntary exchange as the primary mode of economic interaction” (Eaton & Eaton, 1995:22). However, as Hodgson (1989:180) notes, “the idea of transaction costs has become a catch-all phrase and is not employed with sufficient precision and clarity”. In accordance, varying terminological connotations conveying different conceptualisations regarding transaction costs are systematically treated below. This is done in a brief attempt to not only reduce ambiguity by categorically assimilating definitional variety, but also extrapolate key aspects as applicable to the contemporary domestic mariculture industry.

4.3.2 Transaction costs

For North (1984_b) the rationale in formulating institutional bodies is to provide a ready mechanism that enables value-attribute contracts as they relate to a specific form of economic activity to be readily established. Furthermore, institutional bodies simultaneously co-ordinate agents’ actions through the enforcement of applicable working rules associated with property right delineation. However, positive transaction costs emerge to the extent that valued attributes in the exchange process are imprecisely specified due to quantifiable measurement difficulties, as well as the need to enforce contractual arrangements to prevent opportunism. As such, transaction costs broadly

²⁵ Similar calls for extended concession right periods are echoed by the domestic seaweed industry engaging in sustainable harvesting and beach cast gathering activities within specified coastal zoned areas. In accordance, Tronchin & Bolton (2001:8) report MCM is currently negotiating with industry to develop allocation rules where it is envisioned that rights will be allocated for a minimum of five years.

refer to the “costs of specifying and enforcing the contracts that underlie exchange” (North, 1984_b:203). This is generally consistent with Coase’s (1937) original conception of transaction costs as “the cost of discovering what the relevant prices are ... [and] costs of negotiating and concluding a separate contract which takes place on a market” (Hodgson, 1989:180). As such, transaction costs include the “time, effort and cash outlays involved in locating someone to trade with; negotiating terms of trade and drawing contracts; and assuming risks associated with the contract” (Hyman, 1996:102). Furubotn & Richter (1991:10) further attribute transaction costs to embracing all costs associated with “the creation or change of an institution or organisation; and the use of the institution or organisation”.

A more systematic treatment of transactions leads Chamberlain (1963:73) to regard them as comprising of “the three inescapable social relationships of conflict of interest arising from scarcity; inter-dependence of interests arising from the need for exchange; and order arising from the need for establishing a system of working rules and expectations as the basis for exchange”. For purposes of classification, three types of transactions can be distinguished based on Commons’ categorical criteria of legal and functional aspects. These include rationing, managerial and bargaining transactions of which the latter two represent particular significance for the domestic mariculture industry. Rationing and managerial transactions occur between a legal superior and legal inferior. Rationing transactions involve direct influence over wealth or purchasing power by superior legal authority through the actions of legislators (Rutherford, 1983:269). Managerial transactions are analogous with the present administrative activities of MCM, ascribed with general organisation and control over activities under its influence. Bargaining transactions involve the transfer of ownership rights, but as previously elucidated in the treatment of property rights, legal equality is compatible with notions of economic power and influenced by economic opportunity sets and available knowledge (Rutherford, 1983:269). As such, the status of managerial transactions influences co-ordinated efficiency of establishing and maintaining desired growth trajectories for the mariculture industry as a whole. Bargaining transactions hold importance for individual mariculture operators, specifically those whose position as potential beneficiary mariculture development initiative candidates may be undermined by their limited economic power. As Furubotn & Richter (1991:11) aptly note, “the level of transaction costs depends on how the institutional framework, including property rights is organised”.

4.3.3 Information mechanisms

Campbell’s (1987:17) hypo-deductive conceptualisation regarding an abstract theoretically confined optimal resource allocation system is one that “provides households with the goods and services they would choose for themselves if they knew all available production techniques for transforming inputs into outputs, and ... the economy’s stock of primary inputs”. Central to the ideology is perfect knowledge. However, there have been increasing attacks on simplistic narrow assumptions of maximising rationality with known or easily estimatable alternatives. Hodgson

(1989:5) reports this has generated a shift “towards a view of economic phenomena being largely dependent on the result of learning by economic agents ... [where] economic co-ordination is supported by a variety of economic and social institutions”. Although it is conceded that limited attention is generally paid to the ‘economics of information’, complete systematic treatment requires conceptual recognition of a number of variables. These include cognitive progression between processes of sensory data filtering, information retention and knowledge acquisition as influenced by socio-cultural contextual, subjective and individual features of receiving agents (Hodgson, 1989:5-7). Such notions can be extended to revised consumer choice theory. Gruchy (1973:291-292) argues that the purposeful functioning of an individual within a social system and the ‘cultural milieu’ in which they are immersed, influences how human wants are created. However, the need to maintain strategic focus upon more stringent development aspects of the domestic mariculture industry prevents further exploration of behaviouralistic and ultra-individualistic treatment of information.

However, clear implications exist when considering allocation systems for the domestic mariculture industry with respect to formulating a holistic, clearly articulated development framework designed to generate and/or facilitate efficient resource allocation. Such resource allocation is geared towards promotion of articulated progressive growth strategies and implementation of potential incentive-based CPP welfare enhancing initiatives. This is particularly important where programme success is contingent upon the “ability to organise and exploit essential information by means of a communication process” Campbell (1987:17). The establishment of an effective communication mechanism ensures transmission of messages to intended economic agents, and generates evaluative informative feedback regarding agents’ reactions to principal co-ordinating information emanating structures. Furthermore, Barreto (1989:143) argues that direct links with entrepreneurs “is essential if we are to understand how the [institutional-economic] system generates change and growth”. However, in terms of contemporary revisionist micro-economic theory, the prevalence of imperfect information, uncertainty and risk prevent economic agents’ actions from being formalised into “mechanistic, deterministic models” (Barreto, 1989:141). It is thus essential that communication mechanisms are designed in such a way as to operate using efficient information exchange processes while being appropriately sensitive to individual firm behaviour, ensuring feedback is both reflective and accurate. In accordance, stakeholders’ specific knowledge of their immediate environment can be integrated into sectional contingency plans, thereby preventing a potential situation where “the centre pleads patience, [and] those outside cry forward” (Jewkes, 1948:101).

The extent to which effective communication mechanisms reduce imperfect information and by implication positive transaction cost thus represents an essential development aspect within the mariculture industry. Indeed, the need for information exchange mechanisms to be efficient is reinforced by Hurwicz (1990:324), who comments that the extent that informational

decentralisation is viable is dependent upon the costs of processing and communicating information. Furthermore, Dahlman (1979:148) reports that “[the three sequential phases of the exchange process namely searching, bargaining and decision costs] all have in common that they represent resource losses due to lack of information”. In accordance, a tentative argument for “organising agents together under an institutional umbrella ... by pooling information regarding credit, performance and other reliability ratings” (Hodgson, 1989:202) can be made in an attempt to minimise asymmetric information and lower transaction costs. Furthermore, by drawing upon the experience of Taiwan, Biggs & Levy (1991:381) report, “declining transaction costs [enabled] production to become more disintegrated and flexible as producers succeeded with flexible niche competitive strategies”. However, a more immediate manner to contribute towards reduction of information and opportunity seeking transaction costs is through creation and dissemination of viable marketing strategies to prospective new entrants and existing mariculture operators seeking to diversify through value-added.

4.3.4 Marketing

As the official government department for promoting mariculture industry growth, MCM has recognised its co-ordinating role in collating and disseminating viable market opportunities, and actively encouraging value-adding activities to increase industry economic valuation and diversified expansion (MCM, 1999c:136). Indeed, Oakes & Ponte (1996:195) highlight the importance of clearly defined marketing strategies with regard to premium abalone products destined for niche Asian markets, where “profits to be realised from a steady supply of high-quality abalone [need to] meet the regional standards for colour, texture and product form”. Japan and China consider abalone to be an extreme delicacy demonstrating prestige and religious symbolism (Rudd, 1994:2). Oakes & Ponte (1996:189) report “consumer preferences are important in understanding markets ...[where] cultural traditions and consumer tastes make the appearance of an abalone product as important as flavour and texture when determining product value”. Consistent with notions of ‘quality conscious consumers’ and the intrinsic ability of mariculture to significantly improve product characteristics, Salayo et al (1999:66) report that profit maximisation requires identification and realisation of consumer desired marketable attributes receiving price premia, and minimisation of attributes discounted by the consumption market.

In accordance, potential exists for the conduction of hedonic pricing analysis. Callan & Thomas (1996:249) report the hedonic price method “is based on the theory that a good is valued for the characteristics it possesses ... [where this] perception of value suggests that implicit or hedonic prices exist for individual product attributes that can be determined from the explicit price of the product”. Hedonic pricing analysis has been utilised to express prawn and shrimp attributes in the Philippine domestic market (Salayo et al., 1999:65) and tuna prices in Hawaii (McConnell & Strand, 2000:133), based on revealed consumer preference data obtained through analysis of

market price transactions reflecting consumers' behavioural partiality as exhibited by their willingness to pay for marginal quality attributes of specific species. Hedonic price models present a feasible complement to marketing strategy development by helping to "measure economic benefits from investing in the production of seafood with a number of preferred attributes or value-added features associated with a price premium" (Salayo et al., 1999:66). Such analytical economic applications may complement claimed future private sector provision of "an on-line database of prices and market opportunities for mariculture" (MCM, 1999c:136). However, concern is raised regarding over-burdening the private sector's capacity to achieve comprehensive holistic integrated market analysis that adequately incorporates scope for appropriate technology initiatives for future industry development.

In the absence of available complete statistical price data required for hedonic pricing analysis, the more prevalent traditional approach of conjoint analysis may be used. The technique offers scope for learning about consumer preferences [for fish] "where the method relies on answers to hypothetical questions from market participants regarding their preferences for seafood with differing characteristics" (McConnell & Strand, 2000:133). Logistical cost constraints motivate use of established secondary statistical data for foreign market preference assessments for establishing potential differentiated value-added abalone and prawn activities. However, in the absence of a comprehensive price database for lower value produce sold on local markets conjoint analysis offers scope in assessing and promoting greater establishment of domestic target markets for oyster, mussels and fish. This could be extended for evaluation of potential market sources for envisioned socio-economic mariculture development initiatives and emergent commercialisation of new species.

4.3.5 Co-operative organisational arrangements

The establishment of effective communication mechanisms embodying a unification framework has further implications for the potential creation of co-operatives. It is recognised that the utilisation of a co-operative association as a viable organisational framework is ultimately dependent upon the precise nature and detailed description regarding the relative emergent benefits of economic independence and interdependence. However, a more abstract and conceptual approach is adopted. This provides a firm theoretical foundation establishing a basis for further topical discussion by demonstrating the applicability of adopting such an organisational structure. Indeed, co-operatives may provide significant potential regarding organisational arrangements for envisioned CPP development initiatives.

The co-operative arrangement rests upon the presence of two essential components. Firstly, centripetal forces rendering joint organisation of economic activities attractive to participants. Secondly, centrifugal forces preventing members from fully merging into one large firm. Bonus (1986:313) argues that traditional economic centripetal forces of securing economies of scale to

supply members' input requirements, and the increase in market share from collective selling actions leading to the potential creation of market power, provide insufficient justification for establishing a co-operative association. However, it should be duly noted that such factors present realistic motivators with regard to the domestic mariculture industry. Rather, a desire for economic independence and sociologically orientated explanations are advocated where Draheim's co-operative spirit prevails: 'a feeling of common cause' involving arrangements based on trust unites members (Bonus, 1986:319). With reference to centrifugal forces preventing amalgamation of co-operative members into a single firm, Bonus (1986:324-325) argues the rejection by members of dictatorial formalised bureaucratic rules essential to effectively co-ordinate a single large firm, allows them to attain self-employed status and accrue the benefits of independent operation arising from application of idiosyncratic knowledge. Idiosyncratic knowledge is "intuitive knowledge based upon training or experience that is incapable of translation into written form" (Bonus, 1986:328). This is consistent with notions of tacit knowledge, "relating to acquired skills which cannot be readily codified in the form of information that can be passed on to others" (Hodgson, 1989:6). Subsistence fishers may possess these forms of knowledge or other communities traditionally involved with marine organisms for a livelihood. Such knowledge may have relevance when applied with contextually designed appropriate technology CPP mariculture development programs.

It is essential to recognise that successful co-operative arrangements are based upon a high degree of collective goal identification and trust such that a member will not exploit another's weak position. This ensures homogeneity and collective social control (Bonus, 1986:322). The disengagement of a contracting party would obviously exert a detrimental impact on the welfare of remaining members, motivating the need for establishing explicit contractual arrangements providing a comprehensive array of mutually agreed duties and prohibitions. However, in light of unpredictable contingencies and bounded rationality, Bonus (1986:320) argues the application of members' idiosyncratic knowledge, and durability motivated by quasi-rents²⁶ directly associated with transaction-specific investments ensures that members do not violate the trust.

Important considerations regarding the nature of contractual relations emerges when information costs for fully defining projected performance and risk allocation of future contingencies are considered. As such, Klein (1985:595) argues that contracts are "intentionally designed to be incomplete ... [where they are] designed to not only allocate risks associated with underlying uncertainty, but also to minimise the behavioural risk associated with hold-up²⁷". In light of such

²⁶ Quasi-rent of a durable resource is contextually defined as "its present return on investment as compared with the return it would generate in its next best use" (Bonus, 1986:326).

²⁷ Hold-up occurs when transactors opportunistically breach contractual understanding by taking advantage of a freak market change. Klein (1985:595) uses the case of King Edward's coronation to demonstrate a classic case of hold-up, where lessors provided rental space for public viewing of the service. However, upon sudden cancellation of the ceremony due to King Edward's unexpected illness,

variables, Klein (1985:595) purports contractual flexibility and the prevention of hold-up can be achieved by including fewer elements of traditional economic paradigmatic contracting where performance is explicitly enforced by court imposed sanctions. Rather, constraints should include greater implicit contractual enforcement where performance is assured by threat of termination from the transactional relationship. The self-enforcement contractual component associated with threat of termination is determined at any point in time by the capital value of the expected quasi-rent stream arising from returns on transactor-specific investments compared to the short-run gain from breach. As such, “hold-up will not occur if the individual facing termination expects to earn a future quasi-rent stream, the present discounted value of which is greater than the immediate short-run gain from breaching the contractual understanding” (Klein, 1985:595)²⁸.

The establishment of such contracting arrangements bears specific significance for envisioned mariculture development initiatives; particularly those attached as satellites to established formal mariculture firms. By ensuring the autonomy of candidate grow-out farmers, financial loans associated with relevant capital equipment acquisition is directly attached to their person via contractual arrangement. Furthermore, co-operative organisational arrangements with parent firms effectively establish transaction-specific investments in marketing and production technology to which candidates are inextricably bound. This ensures the applicability of implicit self-enforcement contracts between satellites and parent firms. Indeed, the failure of Amatikulu's ornamental fish farming satellite ventures which sought to empower selected wage labourers by transforming them into semi-autonomous grow-out entrepreneurs (Britz, 1995_a:32), was partially attributed to loan repayment defaults by individual farmers. Amatikulu Farming stood surety for all loans made by the SBDC [Small Business Development Corporation] on behalf of previous wage employees. As such, the parent firm effectively owned satellite infrastructure and could exert little power in ensuring loan repayment compliance over what was effectively an extended labour force with no legal accountability for their actions (Landman²⁹, 2001: personal interview).

Although the co-operative arrangement demonstrates the capacity to generate economic independence by internalising crucial transactions common to all members, the approach is characterised by a number of potential disadvantages. This motivates adoption of a cautionary approach when considering implementation. Co-operatives are prone to insider opportunism when unruly members exploit personal idiosyncratic knowledge. Furthermore, shifts in the nature of

lessors failed to modify the contract to change the rental day to the new scheduled procession date. As such, the lessors took advantage of an unspecified element of the contractual understanding to violate the obvious intent of the agreement.

²⁸ Such notions of transaction-specific investments build upon similar fixity-flexibility capital stock composition models, where purchasing machinery renders capital definite and inflexible as it is “fixed for a period equal to the economically useful life of the equipment ... [or] until depreciation exhausts the particular machine, its form cannot be altered” (Kindleberger & Herrick, 1977:55-56). Thereafter, the capital stock once again becomes flexible and liquid.

²⁹ Robert Landman currently occupies a managerial position at Amatikulu Hatchery and was involved with the ornamental fish satellite programme.

centripetal and centrifugal forces may establish alternative hybrid organisational modes such as proposed innovative funding franchise models orientated towards aiding in the realisation of CPP development initiatives as described by MCM (MCM, 1999_c:115-119). In addition, as operations expand extensive physical size may degrade the social environment quality, impairing moral involvement and eroding the co-operative spirit (Bonus, 1986:335).

Finally, with specific reference to organisation of institutional frameworks and contractual enforcement costs, North (1984_b:207) argues that greater homogeneity amongst contributing ideologies defining the formal rules governing the institution and guiding its actions reduces transaction costs on two grounds. Firstly, more resources have to be devoted to gaining consensus and defining precise operating rules when conflicting ideologies among relevant stakeholders are prevalent. Secondly the resultant high cost of enforcement due to non-compliance (North, 1984_b:207). As such, gaining ideological consensus by avoiding alienation of perceived marginal stakeholders exhibits a fundamental influence upon the composite form of co-ordinating institutional structures. The general effectiveness of such organisations is dependent upon securing greater voluntary compliance through consensus generation and shared-ownership with respect to the emergent development framework.

4.4 Concluding Remarks

Property rights essentially develop a socially acceptable framework for mutual coercion. Their composition and assignment will influence industry's future development trajectories, while simultaneously providing scope for dynamic expansion of equality in opportunity. As such, notions of autonomous industry growth operating within a decentralised decision-making framework consistent with the Coase Theorem require rapid abandonment, necessitating replacement by frameworks articulating secure long-term right allocations consistent with legislative objectives. As such, clearly defined property rights providing secure coastal land leases for mariculture are important for further commercial industry expansion. This is particularly important for prospective firms' risk profiles when new operations attempt to secure financial funding. The difficulty in attaining such funding is further discussed in Chapter 5. As mentioned in Chapter 3, development of a GIS system designating potential mariculture development areas is envisioned to expand to a level of sophistication allowing more competent planning. Delineation of specific mariculture regions should further contribute towards generating greater property rights security. Property rights also display importance in realising future socio-economic developments that extend beyond the scope of dynamically expanding equality in opportunity. The possibility of utilising communal land as collective surety in partnership arrangements, and clear delineation of property rights required for sea ranching activities are accordingly discussed in Chapter 5.

The presence of positive transaction costs and distorting asymmetric information arising from poorly structured communication mechanisms present further challenges for the establishment of an integrated development framework. Attention to streamlining organisational mechanisms dealing with the legality of sustainable development issues [as discussed in Chapter 3] and possible resolution of permitting procedures [to be discussed in Chapter 7] should further contribute to improving institutional competence. Furthermore, creation and accessibility of information relating to viable marketing opportunities available to domestic mariculture industry offers a tangible way of establishing a diversification platform and reducing positive information search transaction costs. Finally, potential formulation of co-operative organisational arrangements offers scope for enhanced structural flexibility within envisioned socio-economic development initiatives. Although such arrangements may contribute towards achievement of benefactor autonomy, it is important to acknowledge their success will largely be subject to consolidation of centripetal and centrifugal forces and organisational support.

CHAPTER 5: DEVELOPMENT ASPECTS

5.1 Introduction

As mentioned in previous discussions, mariculture has been identified as a key sector for realising coastal development. Furthermore, mariculture provides opportunities for maximising social and economic benefits in previously marginalised and disadvantaged coastal localities. Promotion of such development initiatives provides an opportunity to alter traditional urban spatial development policies and address dualistic development patterns. As Chapter 3 demonstrated, the domestic industry is presently characterised by commercial enterprises employing capital and technology intensive production techniques. While socio-economic orientated development initiatives may be small economic units, they should not be relegated to self-contained rural subsistence mechanisms using 'stationary technology' displaying little innovation over time. This would effectively create a dualistic scenario with a modern and traditional sector (Myint, 1971_b:315), as discussed in Chapter 2. Indeed, ideas of utilising mariculture as subsistence systems were refuted in Chapter 1 where they were regarded as infeasible by MCM (MCM, 1999_c:94-95).

The following chapter thus seeks to concentrate attention on holistic integrated development of the domestic mariculture industry via synthesis of pertinent aspects sourced from established development economic principles. The emergent analysis is consistent with Johnson's (1964_b:87) "conception of economic development as a generalised process of capital accumulation in conjunction with recognition of economically significant differences between various capital types". By implication, the approach demonstrates the consequent desirability of aiming at development of both complementary capital types and selection of the most efficient combinations of capital types in light of relative cost disparities (Johnson, 1964_b:87).

To promote development of mariculture in peripheral coastal localities, attention is required in three principal areas. While Habbakkuk (1965:1) draws attention to the virtual impossibility of isolating specific variables for successful economic development, as "the factors favourable to development are so varied and have historically combined in so many different ways", a dedicated attempt is made to illuminate strategic aspects that have been intuitively and informally targeted by industry, MCM and previous research endeavours. In accordance, attention is focused upon financial capital availability, technology development for commercial application incorporating appropriate technology initiatives and creation of skilled labour to develop the human capital base.

5.2 Financial Capital

5.2.1 Introduction

Efficient financial systems serve a number of generic functions. These include lowering the cost of financial resources to investors; improving resource allocation, enhancing economic stability and reducing risk (Cole & Slade, 1991:316), largely achieved via the channelling activities of financial intermediaries (Sloman, 1994:705). However, consistent with the economic developmental stance regarding mariculture industry growth, issues concerning low-cost capital availability, micro-finance and efficient distributional mechanisms providing access to financial capital guide analytical enquiry. As such, discussions pertaining to macro-economic monetary policy, money supply transmission mechanisms influencing aggregate demand and general models of broader institutional financial reform are excluded. Further exploration not only requires attention to monetary policy stance, but consideration of “historical financial experience and current structures of both political and economic systems”, (Cole & Slade, 1991:314), which clearly lies beyond the scope of the discourse. In addition, the importance of shifts in International Monetary Fund [IMF] Extended Fund Facilities from policy and institutional reform *programmes* to specific development *project* finance within Sectoral Adjustment Loan [SAL] frameworks is acknowledged. Shifts towards project finance seek to provide quick-dispersed finance (Harrigan & Mosely, 1991:64), aimed at increasing efficiency and welfare in both rich and poor countries (Ruttan, 1989:411). Although this presents an interesting avenue in aiding to achieve realisation of envisioned socio-economic mariculture development initiatives, further discussion of such frameworks is omitted to maintain strategic focus.

It is generally accepted that financial capital³⁰ occupies an important role in the process of economic development. Nevertheless Biggs & Levy (1991:135) observe that “the financial sector does not stand alone, but is just one part of the overall economic system”. Furthermore, capital usage is ultimately dependent upon the social heritage of institutions and individual economic agents’ habit-patterns of thought and action. As such, capital cannot be directly transferred from one form of economic activity to another due to contextual difficulties and problems with choice. However, it is imperative that capital is employed in ways that attempt to meet the needs of the future in the most effective and efficient way, as misuse leads to a loss of opportunity and economic waste (Meier, 1965:110-111).

In accordance, the effective contribution of capital to economic progress is not confined to the utilisation of additional capital assets in an identical manner to those already in existence. Indeed, as Meier (1965:105) notes, additional capital embraces three distinctive processes by “permit[ing] ... a change in the pattern of consumption; widening as opposed to deepening the structure of production; [and] allowing technical progress to take place [via financing processes of] discovery ... or the adaptation of existing knowledge to allow commercial exploitation through innovation in

³⁰Reference to economically valued monetary mediums of exchange used to commence or maintain economic activity (Varian, 1993:304).

product, process or materials". The second and third aspects are of particular significance to the successful development of both the formal and socio-economic development orientated contingents of the domestic mariculture industry.

It is important to recognise that the existence and promotion of a clearly articulated industry development policy is influenced by paradigmatic shifts in the development process itself. These shifts will invariably alter guiding principles influencing the appropriate role and structure of relevant financial institutional bodies. However, in light of recent MCM organisational restructuring and relative infancy of the domestic mariculture industry contributing to the absence of a thoroughly constructed development framework, the following discussion seeks to establish broad economic development perspectives regarding financial capital availability and provision. These perspectives are based on their relation to promoting formal industry growth and the realisation of envisioned socio-economic development initiatives.

5.2.2 Financial system approaches

Categorical classification of financial systems leads Cole & Slade (1991:315) to distinguish two analytical components. This involves "a formal registered regulated and recorded part, and an informal unregulated and unregistered part ...[arising when] the formal component fails to perform financial functions effectively" (Cole & Slade, 1991:315). Generally, formal financial institutions prevail due to extensive imperfections associated with their informal counterparts including "limited information, lack of access to legal systems, and absence of governmental protection ... [implying] competition does not necessarily protect the innocent" (Cole & Slade, 1991:314). However, urban-biased lending patterns of the formal financial sector leads Spier (1994:40-41) to conclude that "the formal financial sector as presently structured, is ill-suited to serve the informal sector or the population at large, including the poor". "Such notions are reinforced by Goulet (1985:288) who regards ordinary banking institutions as inadequate to financing development initiatives in developing countries, calling for the establishment of new institutions, procedures and methods. Furthermore, the urban-biased lending patterns of the formal financial sector contribute to dualism where banks "prefer large borrowers over small ones" (Spier, 1994:41).

5.2.3 Foreign direct investment

The attraction of Foreign Direct Investment [FDI] is cited as a major policy component of GEAR where foreign investment is often "seen as accompanied by technical assistance and training possibilities" (Kindleberger & Herrick, 1977:312-313). However, negative connotations of Marxist-orientated exploitative distortionary 'neo-colonialist' Multi National Enterprise [MNE] arguments (Amin, 1974:152), endangering host nation autonomy and independence "in the wake of massive capital flows and cross-border transactions" (Pillay, 1997:2) are acknowledged. Furthermore, assimilation of generic MNE critique leads Wilber (1973:126) to infer 'imposed' industrialisation

strategies in developing countries are being undertaken to satisfy first world market consumption patterns. However, for purposes of the discourse, these concerns are considered subjective context-bound value-orientated judgements requiring thorough cost-benefit analysis and individual project evaluation for confirmation.

Economic delineation regarding evaluation of foreign direct investment often involves difficult and controversial generation of indicator measures to appraise criteria of profit repatriation and additions to value-added³¹. With respect to profit repatriation, MNE critics often cite Balance of Payments [BoP] data as indicating “exploitative” net resource outflows where profit repatriation exceeds new investment inflows. However, Zuvekas (1979:357) argues “a more appropriate comparison ... is between transfers abroad [plus retained earnings and local profit distribution] and accumulated investment i.e. the rate of return on investment”. As such, Loehr & Powelson (1981:304) report the argument becomes centred on ethical issues regarding whether or not rates of return are too high, whether derived from repatriated interest rate earnings made by MNE profits committed in host country savings accounts, or sourced from lower production costs made available by reduced wage costs sourced from an unskilled labour abundance. Unfortunately space constraints negate a thorough analysis of the issue, forcing comment to be confined to aspects of technological transfer and human capital enhancement. This is underscored by a cautionary approach to the attraction of FDI for domestic mariculture industry expansion purposes.

Formation of joint venture arrangements between a prospective MNE and local private or public firms affords the opportunity for “better access to ... technology, expertise, and markets” (Zuvekas, 1979:360). This holds particular significance for prospective domestic commercial mariculture operators seeking funding, technology access and production of final produce structured towards export. However, realisation of virtuous technological transfer requires careful formulation of clearly articulated technology transfer arrangements to circumnavigate patents held by MNEs. This will permit local adaptation and possible cost reduction of imported technology, allowing local entrepreneurs to take advantage of technological dissemination processes (Wilber, 1973:127-128). Simon (1990:111) further argues for genuine technology transfer rather than mere relocation to occur, involvement of the indigenous workforce in foreign knowledge dissemination and skill acquisitions are imperative. With respect to foreign aid³² accepted for mariculture industry development and project finance, it is important to recognise the need for careful evaluation, specifically when tied aid is linked to forced importation of capital intensive technologies or production processes requiring constant technical support from foreign donor countries (Kindleberger & Herrick, 1977:304).

³¹ Indeed, Kindleberger & Herrick (1977:315) note problems arise with the criterion value-added which “avoids uncomfortable questions of income distribution”.

³² Zuvekas (1979:337) argues misleading connotations associated with “aid” motivate reservation of the term “for outright grants and ...[concessional] loans made on more favourable terms than those prevailing in commercial markets”.

5.2.4 Rural credit extension services

The lack of available financial capital committed by formal financial institutions for rural and peripheral locality projects due to information costs associated with establishing credit worthiness of potential clients has often led to the establishment of rural credit co-operatives. Levin (1996:33) regards a co-operative as being based on the collective savings and decision-making of an interest group or community. Co-operatives are democratically owned and controlled businesses built on a foundation of mutual self-help, creating the opportunity for people to take responsibility for their own financial organisation. As Bonus (1986:316) observes, “by accepting mutual indefinite liability for their own co-operative, they become credit worthy to others allowing normal interest rates to be obtained”. Furthermore, accessing local information pools to ensure credit worthiness of participants, restricting participation in terms of number and physical vicinity of members’ households, and fostering a feeling of self-help regarding collective ownership of the co-operative, ensured the success of early 19th century German rural agricultural co-operatives providing credit extension (Bonus, 1986:317-318). However, although ideologically perceived as affording the poor with self-help hope, such notions require stringent revision when considering practical implementation. Indeed, the limited savings capacity of impoverished rural regions may render them infeasible in light of prevailing adverse socio-economic conditions. In accordance, formalised co-ordinated rural credit extension services represent a more realistic option for the potential financing has envisioned mariculture development initiatives aimed at promoting social and economic welfare in rural and previously marginalised coastal localities.

Snodgrass & Patten (1991:342) report that “the volume of rural credit extended in developing countries has risen enormously over the past three decades”. However, expansion of traditional rural lending programmes perceiving the rural poor as unable to save and thus unresponsive to saving incentives has been associated with a number of generic failures. These include inefficient financial distribution only marginally raising productive output levels, corruptive practices jeopardising integrity of specialised rural lending agencies, and the inevitability of excess demand. Spio & Groenewald (1997:123-127) further attribute failure of traditional strategies to a number of additional aspects. Most importantly, these involve programmes focused on borrower domination detrimentally ignoring deposit promotion. Furthermore, imposition of uneven credit ceilings on rural banks reduces market efficiency. The imposition of distrust-motivated credit ceilings, irrespective of bank lending activities or borrower profile, destroys competition for deposits as once prescribed ceilings are reached, additional deposits represent unwanted idle cash reserves that cannot be utilised for further lending. Finally, traditional rural lending programs neglect the importance of transaction costs and establishment of confident trustworthy financial relationships which contributed to high default rates³³. As such, successful micro-financing institutions require

³³ As an alternative to state administered rural credit extension services, Reuben (1995:37) reports the possibility of diverting government sourced finances to an accepted legislated responsible and accountable institution tasked with holding funds in a trust and

"[innovative financial] design [of] banking services that achieve a high rate of loan recovery ... [and] ensure delivery of financial services in a cost effective manner ... to keep default [and interest rates] low" (FAO, 2001c:6).

Failure of such traditional rural lending systems has generated the formulation of a new market performance view of rural credit. This perspective emphasises mobilisation of domestic deposits and savings as a strategic variable in establishing efficient, effective viable financial lending institutions (Spio & Groenewald, 1997:128)³⁴. The approach is built upon the fundamental tenets of charging commercial rather than subsidised interest rates in rural lending programmes, ensuring the generation of a positive real rate of interest and promoting the autonomous development of rural financial markets (Snodgrass & Patten, 1991:342). This has led proponents of the approach to regard high interest rates charged by the informal financial sector to finance small enterprise as "more a reflection of risk and lender transaction costs than of monopoly power" (Snodgrass & Patten, 1991:343). However, Gathige (1998:29) warns that over-ambitious loan applications amongst rural populations often leads to greater default rates. To further promote rural credit programme welfare enhancement capacity, Kimemia (2000:7) argues that such programmes are "probably more effective if tied to programmes of technological change which generate higher returns to production and income-increasing investment".

In accordance with market-orientated views, where the preferred specialised lending institution becomes one that takes deposits and makes loans, the case of Indonesia's State-owned rural credit reform programme is briefly reviewed in Appendix 3. Although it is recognised that parallels can be drawn between credit needs of potential small-scale mariculture activities and Indonesia's diverse small business practices, direct transferability of the approach is obviously limited by differences in contextual specification, institutional framework and development policy variables. However, the discussion articulates notions that the use of commercial terms functioning within a co-ordinated institutional framework provides marginalised and rural communities wider access to institutional credit and demonstrates that financial dealings with small-scale producers is economically viable.

5.2.5 Facilitatory organisational structures

GEAR recognises that promotion and operationalisation of Small, Medium and Micro Enterprises [SMMEs] occupy key strategic elements for viable employment creation and income generation (RSA, 1996a:12). Based on the premise that most development-orientated mariculture activities

dispersing them to suitable candidates. However, adoption of greater fiscal discipline in macro-economic policy (Gibson & van Seunter, 1997:191) where GEAR seeks to engage "a fiscal deficit reduction programme to contain debt service obligations ... and inflation" (RSA, 1998b:2) may constrain national government financial support for such an approach.

³⁴ Such notions are consistent with Macro-Economic Research Group's [MERG] (1993:272-273) claim that "all South Africans, including the poorest, must be able to keep their money safely in a bank, earn interest on it and use the bank to make payments as they wish".

targeting socio-economic welfare gains along previously marginalised coastal localities can be logically classified as SMMEs, a firm base of institutional support exists to help ensure successful realisation of such development initiatives. Partnership models form an integral component of national government's strategic initiative programme directed at unleashing "the inherent and under-utilised economic development potential of certain specific spatial locations in South Africa" (MCM, 1999c:109).

In conjunction with national legislative and institutional reformulation, localised development-orientated facilitatory organisations are emerging as a pro-active response to the promotion of regional domestic economic growth. A clear example is represented by Centre for Investment and Marketing in the Eastern Cape [CIMEC]. This organisation is owned by the Eastern Cape provincial government, but "act[s] autonomously within the guidelines of the province's economic development policy ... [by being] incorporated as an association not for gain in terms of Section 21 of the Companies Act" (MCM, 1999c:108). CIMEC's primary objective is the pro-active promotion of investment opportunities within the province, and is consequently directly affiliated to Investment South Africa, the national Investment Promotion Agency [IPA]. The organisation aims to generate economic empowerment through the utilisation of credibly designed and practically implementable partnership models, incorporating the public and private sectors, focusing on intended local community beneficiaries.

In accordance with the White Paper's advocacy of sustainable domestic coastal utilisation through the generation of feasible opportunities directed at alleviating coastal poverty, "aquaculture [has begun] to figure prominently in our [CIMEC] current operations" (MCM, 1999c:109). Consistent with national policy and legislative objectives, partnership models thus seek to ensure the accrual of positive benefits to all relevant stakeholders and sustained local economy growth. This is to be achieved through the identification and implementation of SMME opportunities; technological and skill dissemination through capacity building ensuring the development of a feasible entrepreneurial base; and the establishment of virtuous empowerment via equity ownership (MCM, 1999c:111).

The CPPP programme is an initiative of Department of Trade and Industry [DTI] that seeks to "revitalise depressed rural economies through the linkage of resource-rich communities with relevant state and private investors interested in the sustainable utilisation of natural assets ... [through] the facilitation of commercial partnerships and joint ventures ... [where] aquaculture [represents] a key area of focus" (CPPP, 2001:1). The primary focus of the programme is promoting an attractive environment for the development of commercial joint ventures. However, the presence of an Investment Project Preparation Fund financed through DTI's spatial

development initiatives provides tangible assistance in establishing financial support for commercial projects utilising communal or state owned land (CPPP, 2002:1).

The IDC was established in 1940 as “a self-financing state-owned development finance institution whose primary objectives are to contribute to the generation of balanced sustainable economic growth ... [and] further economic empowerment ... by promoting entrepreneurship through building competitive industries and enterprises based on sound business principles” (IDC, 2001:1). In accordance with the organisation’s core strategies, the IDC provides an ideal avenue for promoting development within the domestic mariculture industry in two broad manners³⁵. Firstly, facilitatory financial support [whereby no shareholding or managerial participation is sought by the institution] is usually provided via loan finance following the conduction of comprehensive risk management assessments. Preference is given to projects displaying “economic merit in terms of profitability” or with “developmental impact in terms of jobs, exports, spatial empowerment and downstream opportunities” (IDC, 2001:2). In the case of small, privately owned ventures or high-risk ventures displaying inherent developmental potential, quasi-equity finance is often provided where the IDC assumes a minority stake of 25-49% (IDC, 2001:2). Secondly, and crucial to the success of mariculture development initiatives, the IDC supports opportunities not yet addressed by the market by empowering emerging entrepreneurs and pro-actively investing in human capital “in ways that systematically ... reflect the diversity of South Africa’s society (IDC, 2001:1).

Finally, the recent creation of the Technology Transfer Grant Fund [TTGF] by Khula Enterprise Finance seeks to facilitate access by SMMEs to local or international technology through the provision of loan guarantees. The organisation guarantees 90% of technology transfer transaction expenses up to R1 000 000. This is subject to attainment of a technical evaluation certificate approving the technology transfer from the Council for Scientific and Industrial Research [CSIR] before applications to financial institutions are recognised. In accordance with establishing sound principles to ensure virtuous empowerment of SMMEs, loan guarantees for technology acquisition assume a holistic stance. As such, technology loan guarantees include “training in the use and application of the technology, including demonstration and travel expenditures ... [as well as] legal expenses regarding negotiations and agreement of transfer” (Khula, 2001:1).

5.2.6 Industry development

Cole and Slade (1991:337) argue that the appropriate depth, breadth and diversity of a market-orientated financial system “depend upon the degree of complexity and decentralisation of decision-making of the underlying economy”. However, as economic activities within the real economy become more specialised and diversified, so financial needs become more diverse and

³⁵ Since 1994, IDC investments have successfully facilitated development in rural areas, creating approximately 28 000 jobs (IDC, 2001:1).

complex. Provision of favourable capital investment by the Industrial Development Corporation [IDC] for funding large scale viable economic activities enables realisation of many projects, including the establishment of certain formal mariculture firms. However, capital injections required for the development of industry-specific variables including technological research and adaptation, and skills development are currently lacking. As such, an essential component for further development of the formal mariculture contingent is establishing linkages to development banks, “orientated toward a specific economic activity” (Kindleberger & Herrick, 1977:118). It is important to recognise that associations within a development bank need to extend beyond the Development Bank of South Africa’s [DBSA] current approach of generic facilitatory investment of basic infrastructural development (DBSA, 2001:1) to include a dedicated focus promoting mariculture-specific development. Indeed, apart from addressing formal sector development, facilitation of mariculture development initiatives amongst previously marginalised localities would be consistent with the bank’s newly promoted mandate. This involves ‘striving to be a leading change agent for accelerated and equitable socio-development ... [committed to] sensitivity of the poor’s needs and responsive to clients’ demands ... [by] financing sustainable development in partnership with public and private sectors” (DBSA, 2001:1).

A pervasive argument can thus be made for increasing the availability of financial capital for the emergent and relatively under-exposed domestic mariculture industry. Financial capital access needs to become a permanent aspect of mariculture development as temporary injections of capital “[whether domestic or foreign] disrupt the existing, but do not rebuild new and continuing patterns of economic behaviour” (Meier, 1965:111). However, although improved capital access may contribute in facilitating market access by removing financial barriers for new formal entrants based on investor sensitive interest rates, it should be recognised that limited financial access for purposes of commencing operations is not an isolated constraint. As such, further attention must also be given to distributive mechanisms within institutional bodies concerned with promoting wider availability of financial capital for holistic integrated mariculture development amongst previously marginalised rural coastal communities. In addition, resources need to be allocated for the promotion of sustainable innovation processes, development and dissemination of appropriate technology and augmented by relevant skill acquisition programmes.

5.3 Human Capital

5.3.1 Introduction

Myint (1971b:205-206) reports, “massive injections of capital ... will not necessarily start a successful development process unless a suitable institutional and productive framework exists”. Indeed, this is supported by Meier’s (1965:266-267) observation that “an excessive reliance on physical capital accumulation ... [reduces] acceleration of development [if there is] a deficiency in

knowledge and skills". Many contemporary commentators readily promote the importance of education where "the assumption of positive economic returns from schooling is a basic tenet of development economics" (Taylor & Yunez-Naunde, 2000:287). However, Myint (1971_b:206) argues that no direct relation exists between educational expenditure and the level of technical progress if the practical capacity to adopt technical innovations to solve economic problems is limited. Furthermore, it should be recognised that successful economic development requires not only frequent technical innovation, "but also social and organisational innovations affecting the fabric of the social and economic framework" (Myint, 1971_b:207). This contributes to ensuring adaptive rather than mechanical adoption of innovations in specific situational contexts. In addition, Meier (1965:267) comments that although economic progress is "incorporated in physical capital, the improvements in intangible human qualities are more significant".

Identification and attempts to calculate quantitative measurements of rates of return from education present a problematic obstacle when attempting to directly ascertain the contribution of enhanced learning within the economic development process (Meier, 1965:269). Popenoe (1966:258) reports that from a narrow economic view, internal rate of return methods are accepted that involve "calculating the rate of interest at which higher incomes obtained later in life would just compensate for the direct expenditure on education and the value of income foregone in schooling". However, Colclough (1993:10) observes "estimates of social rates of return assume that market wages [usually unadjusted for unemployment] reflect productivity differences" and are further hampered by imperfectly working labour markets. This renders "earnings a particularly fallible indicator of productivity where – as in many developing countries – large proportions of the wage-employed are in the public sector on administered pay scales" (Colclough, 1993:10). Nonetheless, from a general perspective Zuvekas (1979:154) reports "studies of investment in education in both developed and developing countries show that the rate of return is generally favourable". As such, capital formation is usually identified with net increases in physical or financial commodities. However, Meier (1965:267) argues "the capital stock should be interpreted more broadly to include the body of knowledge ... and capacity training", here termed human capital and referring to "the embodiment of investment in human beings" (Kindleberger & Herrick, 1977:79).

5.3.2 Skill acquisition

Colclough (1993:9) regards "the key sector in the field of human development [as] education". Education contributes to broadening the human capital base enabling knowledge generation of alternative production techniques, increasing availability of necessary skills, improving awareness of existing market conditions and opportunities "significantly link[ing] rural households to new income sources" (Taylor & Yunez-Naude, 2000:296). Furthermore, education establishes institutional structures and capacity that "favours economising effort and economic rationality" (Meier, 1965:268). Simply stated, "income is earned not only by investment in machinery and

other physical capital, but also by investment in human capital" (Wonnacott & Wonnacott, 1979:375). Furthermore, simplistic factor proportion relationships proclaiming capital deficient but labour abundant factor endowments in rural areas, abstractly treating labour as homogeneous units where "each worker's contribution to output is equal to every other's" (Kindleberger & Herrick, 1977:97), need to be abandoned when realistically considering differentiated skilled labour required for virtuous economic development. In pervasive cases where capital-labour ratios may be applicable, Zuvekas (1979:261) suggests purchasing older or used machinery to lower financial acquisition costs in capital scarce circumstances. However, maintenance costs and repair skills present obvious deterrents.

Based on inferences drawn from the education-allocative skill hypothesis, Rosenzweig (1982:107) argues "education serves to augment skills in allocating resources" and contributes to enhancing output for given input levels as "more educated [individuals are]... first to utilise any potentially available and profitable new technologies"³⁶. As Loehr & Powelson (1981:177) aptly note, utilisation of capital-intensive technology selections is often attributed to risk aversion built on perceptions that "machines are often more reliable than people". However, the principles of economic development are essentially socially orientated and directed by equity-driven virtuous empowerment imperatives, "including the training and utilisation of people" (Loehr & Powelson, 1981:181), where enhanced human capital seeks to reduce risk by improving available capacity, thereby altering financial capital intensive biases. It is important to recognise that associations between education-technology adoption and innovation relations are dependent upon labour bias of the new technology. Furthermore, prevailing favourable credit-market characteristics are essential as technology adoption is essentially an investment process consuming financial resources deferring current returns for future gain (Rosenzweig, 1982:108,114).

Loehr & Powelson (1981:235) argue "education may provide potential for both greater growth and increased equity if attention is paid to special development needs". With specific reference to the domestic mariculture industry, emphasis is required on establishing and combining aspects of formal education and technical training. The importance of technical training is reinforced by Meier (1965:269) who regards "on-the-job training including apprenticeship organised by firms" as an important categorical activity in improving human capabilities. Consequently, technical on-the-job training is generally conducted by the majority of operational firms (Hepburn et al., 2001:18). This form of training embodies two distinct forms, each having implication for future policy formation seeking to actively promote domestic mariculture industry development. Such training can either be potentially accomplished via formalised general apprenticeship programmes where a number of employers co-finance training structures and workers accept reduced wages during training periods

³⁶ Writing from a historical economic perspective, Saul (1972:37) reports that "much of the American industrial success derived less from substitution of capital for labour than from the more effective use by its labour of the same capital equipment".

offsetting higher post-training wage earnings. Alternatively, specific individualised skill acquisition that involves direct exposure to the work situation, and wholly funded by a single employer (Kindleberger & Herrick, 1977:103).

The establishment of public [relevant governmental institutional bodies associated with mariculture development] – private [formal commercial mariculture firms] collaborative relationships is imperative to ensure not only the creation of practically employable teaching courses, but also secure industry growth directed learning. The creation of modularised technical on-the-job apprenticeship orientated training programmes integrating theoretical and competency based aspects, attached to an accredited nationally recognised certificate is essential in developing a qualified transferable skill human capital base. Indeed, generation and implementation of holistic successful learning strategy enables firms to “progressively expand and enhance productivity and technical proficiency” (Biggs & Levy, 1991:368). Although critics will no doubt question the feasibility of structuralised education programmes, Biggs & Levy (1991:370) optimistically argue “it [dedicated learning programmes] is hypothesised to be capable of yielding substantial cumulative gains, even in the face of severe initial institutional shortfalls”. However, it is imperative that learning programmes adopt a repetitive action-based practical focus, enabling rapid progression from “learning a technique ... to [habitual mastery] where analytical or practical rules are applied without full conscious reasoning or deliberation” (Hodgson, 1989:127).

MCM has prioritised the need for introducing mariculture into tertiary and vocational education systems (MCM, 1999c:135-136). Furthermore, industry's commitment in contributing to the realisation of such initiatives is evident by general support for proposed mariculture qualifications. The commercial contingent is also willing to contribute towards establishing an employable knowledge base structured around practical skills development (Hepburn et al., 2001:32-33). As such, skill acquisition initiatives provide significant scope for establishing partnership learning programmes directed towards integrated industry development. Australia has also recognised the need for appropriately skilled personnel. Consequently, the WGA³⁷ (1994:19,25) recommends promotion of short-term training courses providing opportunity for practical on-farm training directed at industry specific concerns as well as “incorporating aquaculture extension into tertiary curricula”. Initially, MCM designated a one year time frame for the creation of viable mariculture training programmes (MCM, 1999c:135-136). At present, little has been achieved towards realisation of this objective. Current institutional inability to develop training programmes beyond hypothetical objectives demonstrates the need for greater training programme analysis and aspect diagnosis. This is needed for establishment of the appropriate scope and nature involved with practically employable programme formulation, complemented by an urgent need for a greater proactive MCM stakeholder co-ordination role regarding final training programme formulation and

³⁷ Working Group on Aquaculture [Australia].

implementation strategies. Nonetheless, as Meier (1965:275) notes the “potentialities of fully utilising government agencies, private employers and technical experts are great, but seldom fully exploited”. As such, provision of necessary technical guidance to training organisations, tertiary institution support and greater MCM co-ordination may enable realisation of a suitable externally accredited nationally recognised mariculture qualification.

5.4 Technology

5.4.1 Introduction

The contribution of technology to processes of development is clearly undisputed by contemporary development economic commentators. Technology is perceived as “an instrument of liberation” (Samuels, 1977_b:879) “play[ing] a pivotal role in economic growth ... by shifting old production functions and creating new ones; changing the organisation of productive services and the structure of output; ... and increasing market size” (Schweinitz, 1974:841). Technological advance not only increases general efficiency of commodity production, but also alters the nature in which efficiency improvements may be realised (Thompson, 1973:192). Thompson (1973:192) identifies several forms in which the nature of efficiency improvement may occur. Firstly, a new production process may permit the same amounts of resource inputs to be combined differently so as to yield a greater output than before. Secondly, a new production process may utilise the same types of inputs to produce the same type of output as previously known processes, but require a smaller quantity of one or even several inputs and no more of the remaining inputs to produce the same quantity of output as before. Lastly, a new production process may utilise the same types of inputs to produce the same type of output as previously known processes, using less of some inputs and more of others, yet with a smaller total cost and rate of input usage, to produce the same quantity of output as before³⁸.

However, as De Gregori (1977_a:861) notes, technology is rarely defined, but conceptualisation of the term generally adopts an evolutionary approach where “technology is implicitly conceived of as a succession of devices” operating in a process-orientated continuum. To avoid ambiguity regarding terminology, technology “can be defined narrowly as tools, less narrowly as the material arts, and more broadly as knowledge about how to do things, especially with respect to activity characterised by means-end relationships appropriate to intended purposes” (Samuels, 1977_b:872) that “improve capacity to control and manipulate the natural environment” (Schweinitz, 1974:842). Loehr & Powelson (1981:169) offer the perspective that technology “should be conceived with respect to need satisfaction” and should be defined according to characteristics of product type and nature; scale of production; material; investment and labour inputs. For purposes of this

³⁸ This is analogous to traditional micro-economic “input substitution ... of production under conditions of variable proportions” (Ferguson, 1972:177).

discourse, a broad-based inclusive conception with perpetual process-orientated notions of technology is adopted. In accordance, attention is focused upon the progressive cumulative nature of the technology process perceived as “the sum of human problem-solving capabilities” (De Gregori, 1977_a:866). Such notions are supported by Thompson (1973:28) who argues that when technology is broadly construed, it refers to “the systematic application of organised knowledge of any kind to the accomplishment of practical problems and tasks ... [thereby implying] technology ceases to lie solely within the province of the scientist ... [but] extends to the work of [all] specialists”. As such, technological progress includes not only invention of new physical tools, but organisational innovation enhancing productive capacity of machinery or equipment. Furthermore, it involves local adaptation of technology to suit locality-specific constraints, and the generation of human capital to operate complex technology while leading to the establishment of technology-orientated paradigmatic mental processes to problem solving (De Gregori, 1977_a:866). It should be duly noted the term ‘intermediate technology’ generally denoting production techniques perceived feasible only in Less Developed Countries [LDCs] due to abundant labour and capital scarce endowments is disregarded in the vein of Loehr & Powelson’s (1981:170) argument that the term “implies universality in that some technology is considered [more] advanced regardless of time and place”. Rather, the phrase ‘appropriate technology’ is adopted, designating “efficient technology ... that minimises the social cost of pursuing objectives [where the definition incorporates] a time-space differential [as] what is appropriate in one situation may be inappropriate in another” (Loehr & Powelson, 1981:170).

5.4.2 Technology – institutional interface

The pivotal role that technology has come to play in economic development has witnessed the formulation of theoretical models developed for schematic interpretation of progressive technological advancement. Such models vary from Schumpeter’s invention-based historical capitalist growth explanation, encapsulated within the process of Creative Destruction³⁹ that seeks to establish “the initiating factors in technological change” (Schweinitz, 1974:842), to theory concerned with relations between technology development and institutions. Arguably the most widely received doctrine amongst institutionalists in the Veblen-Ayres tradition maintains that “first, progressive technology may be juxtaposed to passive and inhibitive [ceremonial] institutions, and second, that technology is the primary force in economic and social evolution” (Samuels, 1977_b:873). The Ayresian technological scheme⁴⁰ conceptualises a dichotomy between technological progressive transformation and static ceremonial institutional resistance inhibiting technical advance (De Gregori, 1977_a:862-864). This framework demonstrates the need to

³⁹ Schumpeter (1950:83) purports the process of Creative Destruction involves “the opening of new markets, foreign or domestic, and organisational development ... incessantly revolutionises the economic structure from within, incessantly destroying the old one and creating a new one”.

⁴⁰ Ayres defined technology as “the system of tool-using behaviour, with a tool being any symbol or artifact that has the same observable effect, regardless of the culture or status of the user or observer” (Strassman, 1974:673).

“remove institutional constraints on industrial efficiency” and ensure “social leadership by those least contaminated by ceremonial adherence to established ways” (Samuels, 1977_b:874).

However, the strict Veblen-Ayres conception of technological determinism is disregarded, as apart from being “narrow, inflexible and indeed untenable” (Samuels, 1977_b:877)⁴¹, single-factor explanations undermine the holistic paradigmatic stance guiding the line of inquiry adopted within the discourse. Furthermore, the questionable plausibility of the technology-institution dichotomy is regarded as tentatively applicable to macro-economic structural approaches. However, the framework is inconsistent with envisioned public-private institutional-technology development partnerships within the domestic mariculture industry, and ignores the significant scientific capacity present within MCM’s institutional structure. Furthermore, general consensus among industry is that dealings with Sea Fisheries Research Institute ([SFRI] now amalgamated within MCM) scientists over disease control problems including red tides has resulted in the formulation of successful co-operative partnerships (MCM, 1999_c:44). Indeed, Samuels (1977_b:884) argues that “institutions are a function of technology and technology is a function of institutions ...[where] individual creativity is the source of technology, but is channelled by institutions and the power structure”. Melman’s (1975:59) observation that technology is applied “in accordance with specific social criteria wielded by those [both private and governmental] with economic decision power” highlights the need for integrated participative social goal formulation, rather than building support for notions of rigid inhibitive institutions. As such technological development becomes a welfare issue of ensuring the establishment of mutually beneficial technology-institutional arrangements and responsible organisational structures to collaboratively engage in appropriate technology development, selection and adoption.

Neo-classical assumptions of autonomous technological advance based on perfectly competitive market arrangements signalling motives of profitability and related economic rent extraction capabilities is dismissed by Barreto (1989:61) in light of innovation entry barriers. Barreto (1989:61) reports barriers to entry blocking innovation competition among entrepreneurs involve not only lack of knowledge pertaining to available opportunities due to imperfect information. Entrance barriers also involve considerable financial capital requirements, large requisite initial outlays on education and training, and the existence of possible legal privileges to concept originators Barreto (1989:61). Indeed, the difficulties involved in innovation and the importance of R&D activities in enhancing competitive firm strategies has necessitated the emergence of immaterial intellectual goods property rights analogous to patent systems affording legal protection to innovators. Kaufer (1986:220) argues that the resultant process may have “transformed the

⁴¹ Strassman (1974:684) displays greater sympathy, characterising Ayres technology-institution conceptualisation as “original but with unqualified statements ... [where] he [Ayres] was perhaps simply a displaced philosopher ... who defined technology so broadly that he really should have called it something else”.

patent from an incentive to innovate into a monopoly prospect that spurs unproductive profit-seeking activities". It should be duly noted that calls are not being advocated for fundamental patent system reform to promote greater inventive rivalry. Rather, the intention is to briefly demonstrate how the establishment of a collective private-public R&D co-operative organisational arrangement may promote micro-economic level innovation capacity while ensuring partnership innovations collectively created and owned by participants may contribute to enhancing social welfare beyond that associated with individualistically-orientated patent systems.

5.4.3 Technology development

The fundamental premises of technological progress within the economy as purported by Kaufer (1986:215) are that "realisation of the research conception ... [has ensured] firms have penetrated the science basis of their respective technologies". This has extended the invention-innovation process "over a wide spectrum of activities beginning with basic research and ending in the routine improvement of already existing designs ... [transforming] research and development into an instrument of competitive strategy" (Kaufer, 1986:215). However, as Hodgson (1989:213) notes, "it is widely recognised that the small-scale private enterprise is not well able to make extensive long-term commitments ... [to continually sustain] R&D departments".

This is consistent with calls by the private-sector mariculture industry for greater governmental involvement in technology development and adaptation for local environments, as mentioned in Chapter 3. Dedicated commitment by government regarding technology development within the domestic mariculture industry is motivated by the global occurrence of active government involvement in technology development, which has generated positive benefits for the aquaculture industries of countries concerned. Indeed, Hecht et al. (1992:19) reports "globally, state funded aquaculture has been the driving force behind the development of viable aquaculture technologies most notably in Taiwan, Israel, Chile, Nigeria, the Philippines, Singapore, America, Japan, Norway and Scotland". Promotion of collaborative partnerships represents a further essential aspect for integrating government and industry research endeavours. The importance of collaborative government support is highlighted by Flaasch (1992:31) who attributes success of France's national clam culture partnership programme as arising from dedicated national government finance of project research as "producers could not be asked to assume the risk of yet unproven technologies".

To ensure that research programmes adequately anticipate and satisfy relevant industry needs, a high level of industry participation in object formulation is required. Australia's aquaculture framework thus seeks industry participation in setting research priorities and fund allocation by establishing agency linkages to facilitate a clear understanding of industry research requirements. Moreover, Australian industry participation in research and development projects is further

encouraged through provision of tax concessions, grants and subsidies (WGA, 1994:70). Participation of industry is also important in spreading innovation. This is emphasised by Myint (1971_b:341), who regards Japan's economic development success [including capital concentration in advanced technologies] as indicating "the cumulative importance of myriads of simple technology improvements ... not requiring new investments of capital. Much of the real substance of growth is found in modest types of improvement which are more easily and pervasively adopted, more economical in cost, and often more productive regarding immediate returns in income".

Finally, realisation of envisioned socio-economic orientated mariculture initiatives require availability of appropriate technology. The collaborative framework required for implementing these initiatives will include formulation of partnerships for appropriate technology development. Development of such technology is essential if mariculture is to be effectively used as a mechanism for addressing dualistic development in peripheral coastal localities where limited skills and financial capital access may present large constraints. As previously mentioned, development of appropriate technology involves a time-space differential, rendering it context specific. In accordance, a number of technology applications associated with cultivation within the various domestic mariculture contingents will require contextual investigation. Indeed, "the more the technologies that are available, the greater the range of choices" (De Gregori, 1980_b:222) for appropriate technology development. However, if normative technology selection processes governed by power structures within relevant institutions occurs, Samuels (1977_b:878) argues responsibility, accountability and transparency are essential. With respect to appropriate technology diffusion amongst envisioned mariculture development initiatives, Whyte (1991:183) advocates the adoption of a community leader-based extension agent programme. Trained knowledge agents possessing significant awareness of appropriate implementable technology types essentially act as specialised community representatives affording direct linkages between targeted community technology recipients and co-ordinating programme institutions. Such arrangements foster collective project ownership through broad participation, while promoting rapid technological diffusion by encouraging community-sourced incremental innovation (Lele, 1975:63).

5.5 Socio-economic Development

It is acknowledged a myriad of variables are involved with effective establishment of mariculture development initiatives orientated towards maximising social and economic benefits in peripheral coastal localities. Selective extrapolation of issues common to commercial industry development including financial capital availability, appropriate context-specific technology and the need for skilled labour have been discussed in preceding sections. The purpose of the following component is to offer possible broad conceptualisations regarding the potential form of envisioned mariculture development initiatives. However, before proceeding, it is important to acknowledge

the success of such programmes rests on formulation of collaborative partnerships where attention is given to partnership fundamentals. These fundamentals include the following four aspects.

Firstly, conformity to the established decision-making criteria of an enhanced contribution to sustained local economic growth and employment, empowerment of intended beneficiaries, financial and environmental sustainability of the project. Secondly, institutional design principals to ensure provision of training and capacity building support, and secure long-term land lease arrangements for private sector investors and clearly demarcated stakeholder responsibility. Thirdly, technical design principals generating systems to ensure strong local community involvement with planned projects. Finally, financial design principals that extend beyond capital access to include mechanisms that promote equity participation via recognised land contributions standing as surety or consortium bidding by the community, allowing the private sector to reduce its risk profile in the program (MCM, 1999_c:109-110).

With regard to issues surrounding envisioned socio-economic mariculture initiatives loosely structured upon a semi-intensive small-scale commercial system hybrid (Stomal & Weigel, 2001:2), it is important to recognise that practical realisation of such programmes is contingent upon broadening government's current paradigmatic stance and disposable resource devotion beyond demonstration project frameworks. However, consistent with the inductive process of opening further investigative enquiry, attention is focused on conceptual possibilities in realising collaborative CPP initiatives for integrated sustainable coastal development.

Where the primary rationale for developing mariculture production is orientated towards promoting rural populations' nutritional content via additional dietary protein supplements, Born et al. (1994:533) argue that "aquaculture development [as a component of the food production sector] should go hand in hand with agricultural and infrastructural development". Such notions of agro-aquaculture subsistence farming systems are often advocated for rural development. Andreasson (1992:7) argues that the flexibility afforded by small-scale fish farming allows intermittent harvesting involving periodic fish withdrawals to satisfy immediate basic food needs, or the sale of surplus produce contributing to the realisation of farmers' economic needs. However, Nash (1995_a:18) reports that their economic viability is subject to water and land availability, proving difficult to implement in practice due to the need for "daily management and continuous surveillance often contrary to the lifestyle of such people". As Cruz (1992:51) notes "rural areas need affordable flexible occupational alternatives that fit within the community's traditional life-style".

Alternatively, culture based systems involving natural population stock enhancement of communally-owned water bodies by state hatcheries (Nash, 1995_a:19) are regarded by Balarin

(1997:2) as “offering a wide range of opportunities for a more sustainable increase in production and enhanced use of coastal resources offering scope for community-based projects”. Culture-based sea ranching activities involve release of hatchery-cultured fingerlings into open coastal waters for future harvest. They thus require strategic combinations of “private property management during fingerling rearing and common property management at the time of recapture” (Ungson, 1993:11). However, although there is institutional complexity involved in establishing the systems, they are perceived to harness the strengths of both aquaculture and the traditional capture fishery. Britz & Scott (1998:3) have proposed the potential feasibility of establishing a partnership development-orientated abalone fishery involving reseeding of poached areas along the Eastern Cape provincial coastline to promote alternative means of sustainable resource utilisation, broaden local disadvantaged communities’ abalone access, designed to provide maximum socio-economic benefit and rehabilitate poached areas.

Adoption of a socio-economic orientated approach thus affords small-scale and subsistence fishers’ opportunities for market integration as technology adopted is “transitional between hunting and farming ... [being] intermediary in the evolutionary process of technological change transforming fishers to farmers” (Balarin, 1997:2). As such, Ungson et al. (1993:170) argue that the approach demonstrates “an important [future] role in coastal fisheries management by enhancing natural resources and providing protein and income to coastal communities”. However, it is imperative to acknowledge the need for a thorough evaluation of a number of aspects. These include proposed sea ranching technology, prevailing targeted beneficiary socio-cultural organisation, committed government support at all levels, securing finance and establishment of appropriate legal frameworks and implementation systems (Ungson, 1993:12).

Establishment of CPP arrangements involving satellite ground operations represents a more immediate possibility for maximising social and economic benefits of mariculture in peripheral localities. Although formal industry reported limited knowledge regarding the nature of CPP relationships, firms were potentially willing to contribute private resources towards the realisation of development initiatives. Areas of expertise available displayed contingent specific variation. However, general spheres of support included knowledge dissemination, technological diffusion, capacity building, business planning, organism supply, equipment provision and marketing facilitation (Hepburn et al., 2001:35). The private sector displayed potential willingness to become involved in the establishment of forward attached grow-out production satellites to suitably skilled candidates (Hepburn et al., 2001:34) where the satellites are directly associated with the larger formal contingent parent firm by contract (Thompson, 1973:24). It is important to recognise that variations in contractual obligation and organisational design complexity of envisioned CPP satellite initiatives will occur, reflecting production technology modalities, prevailing beneficiary socio-cultural arrangements and locality-specific constraints. However, establishment of parent-

satellite operations effectively creating a hybrid co-operative organisational mode blending market forces with elements of internal organisation ensures realisation of benefits associated with collective organisation. Vertical integration provides scope for independent operation, freeing satellite operators to improve productivity residing in application of their peripheral idiosyncratic knowledge (Bonus, 1986:332-333). However, committed private-sector participation is largely dependent upon governmental provision of an economic incentive-based framework incorporating the collaborative shared-responsibility ethos of CPP relationships and clearly articulated within a development implementation strategy (Hepburn et al., 2001:34).

5.6 Concluding Remarks

Mariculture has been identified as a key sector for maximising economic and social benefits through coastal development. Furthermore, promotion of an envisioned socio-economic orientated mariculture initiatives in peripheral coastal localities offer the opportunity to address dualistic development disparities. However, realisation of greater industry development requires attention to a number of aspects. The chapter sought to highlight issues of financial capital availability, technology development, human capital enhancement and conceptualisations for socio-economic development initiatives.

Availability of competitively priced financial capital plays a pivotal role in processes of economic development. The urban bias of formal financial lending institutions motivated by perceived risk and high information costs of assessing development-orientated projects renders ordinary banking institutions as inadequate finance sources for development programmes. The large capital outlays required for establishment of commercial mariculture operations has rendered it difficult for many firms to secure finance. Attraction of FDI is consistent with macro-economic policy and advantageous where joint ventures with local firms may involve technology transfer arrangements and market access for exports. However, general critique of MNEs requires a cautionary approach to be adopted where each prospective partnership is subject to comprehensive review.

Difficulty in securing competitively priced financial capital presents a barrier to realisation of socio-economic mariculture initiatives in peripheral localities. Co-operatives are often proposed as a means to generate a funding source within a community. Although these are democratically owned organisational forms built on a foundation of mutual self-help, prevailing adverse socio-economic reality in rural regions generates concern over the capacity of co-operatives to generate collective savings. In light of failures experienced by traditional borrower dominated rural lending programmes, an argument can be formulated for adoption of a market-performance view.

In the long term, formulation of a development bank specifically designed to meet the needs of the commercial private sector and socio-economic programmes would provide considerable impetus to

mariculture development. However, a more feasible contemporary approach involves extension of the IDC's activities, orientated towards mariculture industry development. Linked to various facilitatory organisations including CIMEC, CPPP and Khula will further improve institutional support ensuring capital access is associated with viable initiatives.

Greater financial capital availability in the presence of human capital deficiencies and unsuitable institutional frameworks retards development progress. At present, skills shortages within the domestic mariculture industry has witnessed many private sector operators engaging in firm-specific skills development programmes to train current employees. However, development of a broader human capital base is essential for realising both commercial and socio-economic development initiative expansion. As such, formal education linked to on-the-job practical skills acquisition orientated programmes operating within collaborative public-private partnerships are essential.

Technology is another vital instrument for promoting growth in the mariculture industry. The difficulties experienced by industry regarding application of foreign technology and cultivation principles to local context-specific environments represents a further constraint to mariculture advancement. Furthermore, individual private enterprises are generally incapable of sustained R&D activities. Consistent with global aquaculture trends where the state assumes an active role in technology development, partnership arrangements between government and the domestic industry are sought. The current scientific capacity within MCM and the innovative ability of industry presents significant potential for formulating collaborative technology development and transfer programmes. Furthermore, partnerships are required for development of appropriate technologies for envisioned mariculture development initiatives. It is important to recognise a high level of community involvement for technology development and local innovation is required.

Finally, conceptualisations regarding the possible form of partnership based envisioned mariculture development initiatives were discussed. Use of agro-aquaculture activities orientated towards satisfying beneficiaries nutritional content needs were deemed difficult to practically implement, as projects need to be compatible with traditional life styles. Alternatively, implementation of culture-based systems to complement natural stock levels affords greater scope for community based projects. However, adoption of such long-term initiatives is subject to consolidation of the complex institutional-legal environment required for their success. Establishment of CPP relationships realised through forward attached grow-out satellites represent a more attainable option, considering the current status of mariculture development in South Africa. Although the private sector displayed limited knowledge of CPP relationships, firms were willing to provide support in a number of areas to contribute towards realisation of these initiatives.

CHAPTER 6: MARICULTURE INDUSTRY PLANNING

6.1 Introduction

The following chapter's treatment of planning perspectives focuses on broad conceptualisations and pertinent planning aspects as they relate in contributing to the establishment of a holistic integrated framework for realising the inherent growth potential of the domestic mariculture industry. Such a degree of abstraction necessitating omission of intricate planning techniques and formal models is justified by the extensive complexity associated with involved technical planning procedures. These require dedicated systematic treatment of industry-specific data, clearly lying beyond the confines of the discourse. Furthermore, presentation of a broad planning conceptualisation consistent with emergent industry status and current MCM objectives regarding the formulation of an integrated planning framework is compatible with the inductive, exploitative and generative approach adopted throughout the discourse.

6.2 Planning Overview

Planning is generically utilised for problem anticipation, uncertainty reduction, orderly systemisation of available feasible opportunities, improving efficient resource allocation, and "introducing more rationality into decision-making" (Zuvekas, 1979:195). This is based on iterative procedures involving successive application of modifications to improve the original arbitrary plan (Heal, 1973:65). In accordance, the criteria of monotonicity, where "each step leads to a new plan with a higher value of the objective function than that given by the previous plan" (Heal, 1973:74), thus becomes an essential trait of successful continuous planning procedures. As such, "planning is the design of actions which will change the object in the [desired] manner that has been previously defined [to achieve a prescribed goal]" (Ozbekhan, 1968:54). In accordance, planning as "a process involves the application of a rational system of choices among feasible courses of investment and other development possibilities based on consideration of economic and social costs and benefits" (Waterston, 1966:401). From a traditional economic stance, planning thus provides an effective framework for "bringing together land and labour in ways which are constructive for capital" (Cooke, 1983:251) enabling the establishment of "a programme for applying a system of state interfaces with the play of market forces" (Myrdal, 1963:79).

However, it should be duly noted that a programme cannot transform the quality of decisions beyond that of their original capacity as determined by information availability and existing institutional capacity. Furthermore, Jewkes (1948:122) comments that "a remarkable consequence of the growth of planning ideas is the extensive use of vague and obscure terminology ...[where] on occasions these nebulous terms are deliberately adopted to mislead:

more frequently they are the result of muddled thinking or are merely a substitute for thought itself". Such notions are supported by Klaassen & Paelinck (1974:8) who report that communication difficulties between planning groups regarding terminological usage is attributed to strict adherence to their different intellectual and administrative groupings, creating "a prior diffidence towards other approaches". Furthermore, Meier (1965:561) perceives the most severe constraint regarding establishment of a feasible development plan as the absence of systematic development theory "that can be readily translated into a development plan"⁴².

In cognisance of such observations, a committed attempt is made to ensure the following integrated analysis of planning schematic frameworks relevant to promoting domestic mariculture industry growth are pertinent, clear, concise and unambiguous. Before proceeding, it is imperative to acknowledge the adopted perspective that economic planning objectives are not unqualified technical uni-dimensional goals of 'progress' or 'growth'. Rather, economic planning objectives must include attention to social and individual needs while preserving local democracy and autonomy (Hodgson, 1989:271). Furthermore, attention is given to the importance of integrative planning. This involves "planning for change in a complex dynamic system" that recognises the imperative role of appropriately formulated responsive institutional frameworks for the realisation of planned change (Jantsch, 1968_a:471).

Traditionally, two types of theoretical economic development planning approaches exist. Firstly, economy wide aggregate macro-models or planning from above. Secondly, localised regional specific planning increasingly associated with the bottom-up approach. Bottom-up planning is often concerned with individual project evaluation based on the rationale that "any plan, by definition, is a collection of projects" (Srinivasan, 1982:230). Projects are regarded by Srinivasan (1982:230) as "an activity which produces a vector of outputs from a vector of inputs ... [where] inputs and outputs [are] distinguished by a time period of their use or availability". Macro-models can be categorically distinguished between Tinbergen's decomposed planning-in-stages approach and Frisch's simultaneous planning procedure. The planning in stages approach consists of three phases. Firstly, a macro-phase where a growth target for national income is set. This is followed by a middle phase where production expansion by sector and region is established based on national income increases determined in the macro-phase. Finally, a micro-phase where projects are selected in accordance with the planned expansion and location of their corresponding sectors (Klaassen & Paelinck, 1974:19). The simultaneous planning technique deals with many aspects of the economy simultaneously. It is concerned with development of under-developed regions, optimal development of transportation networks, and location of industry where decisions for

⁴² By drawing upon various applications of the term 'national interest', Jewkes (1948:124) demonstrates how it can be utilised as "a highly convenient device for justifying dictatorial action ... [where] so long as no-one knows what the national interest is, an ingenious planner can make a good case for practically anything".

expansion are based on establishing elaborate technical co-efficients that describe the possibilities for increasing capacities (Klaassen & Paelinck, 1973:20).

However, it is argued that co-ordination difficulties between sectors, data shortages, and excessive generalisation arising from abstract aggregational development variable treatment ignore locality-specific restrictions (Klaassen & Paelinck, 1974:19-22). As planning from above is essentially a macro-exercise, Loehr & Powelson (1981:47) argue that it contributes to centralisation, thereby enhancing leverage of political influence over local community development units and reducing planning efficiency. Furthermore, Colm & Geiger (1970:302) argue “a system of centralised direction of production, investment and consumption is susceptible to ... inflexibility of bureaucratic control”. Consequently, the spatial dimension afforded by regionalised planning offers greater applicability when successfully co-ordinated and integrated. Furthermore, the complexity of macro-models often exceeds available technical capacity for successful implementation, while quantitatively biased systematic assessments ignore inclusive treatment of institutional and related human resource aspects (Loehr & Powelson, 1981:48). In an attempt to reconcile inherent flaws associated with macro-planning, Loehr & Powelson (1981:49) propose aggregation of bottom-up planning. Independent sectoral working groups functioning at local community or individual firm level, and initially without complex econometric models, establish sector-specific planning frameworks. Resultant recommendations are then proposed to the government planning authority. Nonetheless, Zuvekas (1979:198) argues regional planning is often advocated as a mechanism for “reducing regional inequalities, provision of base-level participation in project planning and implementation, and improving national resource allocation”. However, it is important to note regional planning is not without critique. Nash (1995_a:95) comments that problems posed by regional planning include difficulties in delineation of appropriate size and definition of a region such that “the size is not so small as to lead to undue fragmentation ... yet small enough to enable rapid feedback”. Further difficulties include identifying regional needs in a non-paternalistic participatory manner; establishing suitable decentralised organisational systems compatible with regional planning; and training regional managers to ensure successful programme formulation and implementation (Nash, 1995_a:97-100).

For purposes of the discourse, attention is directed at aspects surrounding focused planning. This is consistent with MCM's adoption of the 'sector planning approach' as a framework for realising domestic mariculture industry development. Although requiring establishment of semi-autonomous planning units within relevant government agencies, the confined focus of such an approach reduces technical and political complications. Subsequently, the technique “promises to be more

effective than comprehensive [macro-economic] planning” (Zuvekas, 1979:200)⁴³. Whilst not seeking to base criticism solely upon technocratic categorisation of planning approaches, it should be duly noted that MCM’s classification of the emergent and thus quantitatively limited domestic commercial mariculture activities as a sector rather than an industry must be regarded as erroneous when viewed from an economic perspective. As such, the ensuing analysis examines variables pertinent to development of a mariculture industry plan. By confining the main focus of attention to a single industry, it is argued that the emergent framework demonstrates potential for greater compatibility with decentralised planning schemes. However, before proceeding further, a brief overview of MCM’s current planning framework generically constructed upon the adopted guiding principles of a ‘Nash Sector Plan’ is provided. Thereafter conceptual analysis of specific planning variables as they relate to domestic mariculture industry planning is resumed.

6.3 Current MCM Planning Framework: Nash Sector Plan

MCM has currently adopted a selectively isolated approach viewing development within the domestic mariculture industry as removed from broader economic development policies while seeking to formulate development plans centred about the industry’s output classifications (MCM, 1999_c:126). As mentioned in Chapter 1, planning of the industry was only initiated in 1999. This occurred through a discussionary workshop attended by relevant mariculture stakeholders and guidance from Dr Nash (MCM, 1999_c:1). Nash’s proposal for establishment of a domestic mariculture industry ‘sector plan’ involves formulation of a perspective; medium-term, annual/operational and a rolling plan to ensure continuity (MCM, 1999_c:125-126). The principal largely self-explanatory activity areas of a sector plan as purported by Nash (1995_a:76) include the following:

- Choosing objectives
- Undertaking a stocktaking and diagnostic survey
- Making demand and supply projections
- Setting targets and allocating resources
- Choosing strategies and policies, programmes and projects
- Identifying public expenditure programmes and financing
- Identifying institutional changes involved
- Monitoring, reporting and control
- Training may also be included to improve levels of management and decision-making, and to fill the gaps in specialist technical positions.

⁴³ However, Meier (1965:509) reports that the sector approach is “generally recognised to be inadequate as a basis for policy development because it does not provide a test of the consistency of decisions made in each sector, nor a way of comparing high priority projects in one sector with those in another”.

As events at the national mariculture planning workshop were largely discussionary in nature, not all the above aspects received significant attention. However, general implementation of the approach has led to formulation of the following broad-based guiding objectives listed below.

- Increase the perception of mariculture in the country and its many benefits
- Provide an enabling climate for increased participation and equity in the industry
- Promote mariculture as an important element of integrated coastal management
- Establish mariculture as a supplementary source of fish and shellfish for domestic markets
- Develop a mariculture industry compatible with responsible stewardship of the coastal regions and their resources (MCM, 1999c:131).

Considering the notable absence of any previous mariculture industry planning initiatives, the workshop sought to cover a wide variety of general issues. The scope and high level of representative participation at the workshop must be commended where 100 stakeholders in mariculture development were involved. MCM report “the delegation was represented by 17% from government departments other than DEAT [18% from MCM], 13% from non-governmental organisations, 14% from tertiary educational institutes, 19% from industry, 7% consultants and 3 % from the SADC region” (MCM, 1999c:1). As such, the national planning workshop provided a successful foundation for initiating mariculture development. It is important to note regionalised planning also occurred in the Northern Cape province. However, the forecast planning was generally confined to identification of potentially feasible projects. The lack of role clarification due to weak links between MCM and the Northern Cape provincial government contributed to extremely limited MCM participation in the planning process (Britz et al., 1999:18). Furthermore, scarce funding has effectively reduced the plan to a short-term time horizon “with no specific commitment of implementation in the medium to longer term” (Britz et al., 1999:47).

However, progress towards realisation of an integrated mariculture development framework and plan implementation remain in a state of limbo. Although the broad planning objectives outlined above are accompanied by a concise rationale and included a brief outline of proposed strategies augmented by time-specific recommended actions and responsibilities of various stakeholders, specific details are conspicuously absent. As such, a complete integrated framework clearly articulating identified governmental and relevant institutional roles and available capacity for promotion of inter-related strategic development variables remains unrealised. Furthermore, although initial projections for sector plan completion within a one-year time period existed; there is a notable absence of a proposed two-part final document for distribution among relevant stakeholders and interested parties. Component one was to constitute the main document, presenting development guidelines detailing implementation mechanisms and budgetary outlays, and component two to provide secondary supporting information (MCM, 1999c:128). Unfortunately

their absence indicates planning stagnation. Casual tentative observation thus reveals that planning actions have not progressed much further beyond objective identification. There is little available evidence to demonstrate informed target setting beyond that achieved during the workshop, hindering comprehensive formulation of development programmes, institutional linkages and finance strategies. In accordance, a number of aspects specific to further aiding in the attainment of a comprehensive integrated planning approach are considered in the following discussions.

6.4 Decentralisation

Decentralisation is generally “concerned with the structure of information flows in the planning process” (Heal, 1973:71) where it is associated with reducing information amassing, manipulating and processing difficulties experienced by a single planning agency⁴⁴. Heal (1973:71) argues that an alternative interpretation involves decentralisation of authority in decision-making, consistent with accepted notions of “a significant measure of private economic decision-making as an essential complement to the economic functions of central government” (Colm & Geiger, 1970:302). Important implications thus exist for institutional planning where attention is specifically focused on “organisation of decision-making processes ... [and] distribution of decision powers over the levels of government” (Klaassen & Paelinck, 1974:44) when considering potential establishment of co-ordinating structures dedicated to promotion of envisioned socio-economic mariculture development initiatives. It is thus important to recognise the need for an adaptive, flexible, responsive and empowering emergent institutional framework compatible with notions that “development is not so much a system, as people with initiative, insight and drive” (Claassen, 1994:18).

Indeed, if government is seriously considering realisation of virtuous economic empowerment amongst previously marginalised rural coastal localities utilising appropriate technology-based mariculture initiatives, decentralised planning mechanisms promoting beneficiary participation is an essential component. In accordance, adoption of a LED ethos demonstrating a paradigmatic shift away from deterministic orientations of human progress stressing uniformity and predictability towards post-modernistic thought reflecting individualism, uniqueness and local autonomy (Nel, 1999:5) within the development framework is essential. The LED approach thus aims to establish

⁴⁴ In the extreme, the market mechanism may be advocated as a sufficient development-planning instrument based on the rationale that “a properly functioning market system stimulates both economic efficiency and growth ... while [requiring] no big administrative apparatus, no central decision-making, and very little policing other than the provision of a legal system for the enforcement of contracts” (Johnson, 1962a:156). However, Meier (1965:415) demonstrates concern pertaining to the ineffectiveness and irrelevance of a weakly functioning market mechanism when utilised for the planning of accelerated development, as a poorly defined price system establishes “market prices of goods and factors [that] are not a true reflection of their opportunity cost to society”. Furthermore, Hirschman (1964b:76) argues market forces devote insufficient funds for projects [education] where output has no readily assigned or fully recoverable market value. Additional critique relating to market-based allocation is reflected in Chapter 2.

an applied development strategy seeking to address site-specific needs via locally appropriate solutions (Nel, 1999:1). Furthermore, Molokti (1994:1) states the “new paradigm of development recognises not only the crucial role that cultural, political and social structures play ... but also the contributions that intended beneficiaries of development programmes can make towards project success”. Adoption of such a framework draws on notion that “the basis of development is giving people a sense that they can take charge” (Spier, 1994:2).

The importance of participatory involvement within planning and decision-making processes ensures that individuals do not lapse into passivity and lose enthusiasm (Hansen & Lubin, 1995:164). It simultaneously establishes a democratic environment to foster accountability, collaboration and “self-expression generating personal growth, openness and recognition of the importance of expressing [one's] feelings” (Blunt et al., 1996:78). Furthermore, community involvement within the development processes “creates a direct awareness of resource scarcity ... [and time required] to eliminate backlogs in social and economic services” (Spier, 1994:47). Incorporation of intended development beneficiaries may instil a greater degree of ‘Africanism’, aligning project operations with procedures more familiar to local rural communities (Lele, 1975:128). This may contribute to enhance receptiveness through shared-ownership and increased contextual compatibility of programmes. Indeed, Meier (1965:563) argues, “regardless of the economic logic of the development plan, its success in gaining popular support and participation will depend on cultural elements⁴⁵, values and attitudes”.

6.5 Planning Approach Consolidation

However, Hodgson (1989:270-271) notes that whilst considerable decentralisation is required to ensure flexibility and responsiveness, long-term research orientated and knowledge-intensive industries require interventionist frameworks to co-ordinate economic activity through centralised information and knowledge purveying institutions. A synthesis between applicable aspects drawn from both centralised top-down long-term investment planning broadly guiding future development, and decentralised short-term orientated bottom-up approaches dedicated to regional and locality specific concerns (Klaassen & Paelinck, 1974:58-59). Such integration would thus provide the ideal mix for an emergent holistic integrative planning framework. It is suggested that a centralised approach be employed for long-term objective formulation. This includes establishment of collaborative partnerships requiring centralised co-ordination in areas of technology development and dissemination, human capital formulation, and disease control; and regulation criteria requiring legal enforcement to ensure compliance. Top-down strategies are often criticised as being conceived, organised and implemented from centres of political and economic power with little

⁴⁵ Culture refers to shared values and beliefs existing within a given society, including accepted behavioural mannerisms and norms (Smither et al., 1996:15).

regard for intended target group interests (Simon, 1990:11). This often leads to the development potential of specific cultural and institutional aspects integral to local community welfare being ignored (Stohr & Taylor, 1981:44). As such, bottom-up planning represents an essential component for feasible realisation of participative mariculture industry planning. As previously noted the technique offers provision for participative community involvement⁴⁶ contributing to capacity development via appropriate skill acquisition, enabling the development process to become self-sustaining (Lele, 1975:20). Furthermore, scope exists for affording greater attention to private sector concerns through the adoption of a more decentralised micro-economic framework. In addition, it affords vital inclusion of regional and local authorities whose inherent knowledge of locality specific aspects are often ignored by broader planning frameworks, yet are essential for programme success.

Participation of the commercial private sector in programme planning specific to industry development is not only essential in aiding to solve formal contingent expansion obstacles and establish collaborative relations. Furthermore, “the practical experience of the private sector and its contact with realities of the market place ... should be available to inform governmental action programmes” (Honey, 1970:107). Private sector formulated strategic industry-specific contingency plans detailing future expansion trajectories and input requirements should be presented to government planners promoting dialogue and negotiations. Colm & Geiger (1970:313) comment that these “are important not only to ensure consistency in the requirements of the public and private sectors, but also foster constructive attitudes on both sides and mutual understanding”.

6.6 Time Horizon Consolidation

Although feasible planning is generally conceived as operating within a short-term⁴⁷ constrained maximisation environment “where the problem is specified in the form of an objective function to be maximised” (Heal, 1973:20), it is important to recognise the vital role of target related long-term capacity enhancement planning if the inherent development potential of the domestic mariculture industry is to be realised. However, “since planning is a continuous process, there must be the provision for the necessary revisions of the original plan” (Meier, 1965:563). As Kindleberger & Herrick (1977:361) note, “rollover planning is a response to the desire for quick and flexible results ... [where] 5-year plan revisions renew the planning process rather than making its work obsolete”. Indeed, Nash (1995a:82) argues adoption of a “rolling plan” technique involving perpetual additions

⁴⁶ Paul (1988:1) regards community participation as referring to active processes where beneficiaries influence the direction and execution of development projects rather than passively receiving a share of resultant benefits.

⁴⁷ The short-term typically designates a time period of 5 years or less, by sanction of customary economic tradition where short-run capital equipment is fixed and resource constraints absolute; and in terms of detailed planning criteria where acceptable approximations regarding complete descriptions of production and distribution are only practically feasible up to a maximum forecast period of 5 years (Heal, 1973:63-64).

of one-year time periods to the medium-term plan after appropriate evaluations and revisions “has the added advantage of providing a medium-term plan with up-to-date benchmarks for annual plans”. In accordance, Nash (1995_a:82) perceives the use of perspective, medium-term and annual plans as solving the time horizon problem: the perspective plan broadly guides development over a 10-15 year period; the medium-term plan provides interim goals; and the annual plan ensures operational feasibility by establishing required annual budgetary expenditure and enumerating in sufficient detail measures to be adopted to achieve objectives (Nash, 1995_a:83). Based on the outcome of the national mariculture planning workshop, MCM has recognised the conceptual importance of reconciling various time horizons. Although MCM has become the lead agency for mariculture development where the organisations’ duties extend to co-ordinating and drafting an industry plan, an annual plan has yet to be created. This is despite realisation that formulation of an annual plan detailing the specifics of development for the course of the year was deemed important (MCM, 1999_c:127).

6.7 Further Aspects

For increased harmonisation between public planning implementation and private decision-making, Colm & Geiger (1970:309) argue that announcement of finalised plans demonstrating governments’ commitment to programme execution may motivate required private sector investment “by revealing opportunities for likely expansion ... [where] it becomes a matter of self-interest on the part of entrepreneurs to increase productive capacity in line with opportunities highlighted in the plan”. However, success of the ‘announcement effect’ depends on “the conviction that the plan is feasible ... and government and other private decision makers will play their respective roles” (Colm & Geiger, 1970:310). Furthermore, complementary incentive-based approaches including taxation benefits and preferential financial capital provision made available through development banks “providing not only funds but also managerial advice, particularly to new enterprises” offer additional possibilities for promoting private-sector participation (Colm & Geiger, 1970:310-311). Indeed, findings of the interim 2001 National Mariculture Baseline demonstrated the importance of economic incentives in promoting potential formation of community orientated satellite grow-out projects directly linked to established formal privately owned enterprises (Hepburn et al., 2001:34).

However, although inducement-orientated approaches may motivate collaborative participation, Gant (1966:381) argues that lag frustrations between plan implementation and accomplishment are prominently attributed to administrative inadequacies. Rather than merely assessing available institutional arrangements for programme implementation, active attempts to enhance existing capacity are essential. This is highlighted by Watson & Dirlan’s (1965:421) claim that “organisational weakness and shortage of competent personnel” are crucial obstacles to changing

the condition of under-development. As such, institutional capacity building embodying 'development administration' becomes an essential component for evaluating economically feasible plans in terms of their operational and administrative practicality prior to implementation. Development administration "focuses attention on organising and administering public agencies in such a way as to stimulate and facilitate defined problems of social and economic progress ... [involving adaptation] and application of management skills directly to the development process" (Gant, 1966:382). Furthermore, improvements in development administration should ensure that adequate personnel, competence availability, and decision-making authority meet the requirements of the development programme (Gant, 1966:384). Indeed, Waterston (1966:403) comments "experience shows nothing hampers the success of development plans more than the separation of plan formulation from provision for implementation". A crucial component of any development policy is thus the "goodness of fit between the chosen strategy and the institutional environment in which the strategy is to be implemented" (Biggs & Levy, 1991:366).

Recent MCM restructuring has witnessed a paradigmatic administrative shift from command and control policies towards more multi-faceted and multi-tasked organisational arrangements. This is consistent with acknowledgement that an approach seeking to solely maintain law and order "is not suited for the more subtle administration ... to the complex operation of economic enterprises" (Meier, 1965:563). The administrative shift is important to create an organisational form with effective management capacity as expansion potential of the domestic mariculture industry is realised. However, the need for flexible responsive organisational structures suited to both administrative and planning-programme implementation functions requires attention to institutional planning. This involves dealing with the nature of complex social systems regarded as "high-order⁴⁸, multiple-loop⁴⁹, non-linear⁵⁰ feedback structures" Forrester (1968:238). Based on these characteristics it is essential to understand the dynamic internal nature of complex systems, to generate an improved understanding of the root causes of existing difficulties rather than superficially treating symptoms. Adoption of such an approach may simultaneously help bridge the gap between goals and project implementation assisting to contain large ineffective programme expenditure (Forrester, 1968:243).

Waterston (1966:405-406) argues that the lack of pre-investment studies of projects for implementing a comprehensive plan often results in excessive project costs. Furthermore,

⁴⁸ The complex system is of high order due to the large number of integrated levels [such a management hierarchy within an organisation] required to ensure functioning of the system (Forrester, 1968:238).

⁴⁹ A feedback loop describes the environment around any decision point in the system. The decision leads to a course of action changing the state of the surrounding system, giving rise to new information on which future decision are based (Forrester, 1968:238).

⁵⁰ As the system is non-linear, different feedback loops can dominate the system at any given point in time. In accordance, Forrester (1968:239) argues that attention should be directed away from futile attempts to accurately measure social system parameters towards the far more important matter of system structure.

inadequate financing contributing to choice of low-yield projects may occur, as well as construction delays due to unforeseen technical problems causing programmes to exceed designated time periods. An additional important aspect with regard to planning envisioned socio-economic mariculture development initiatives thus involves development and selection of appropriate technology types.

With reference to selection mechanisms, Jantsch (1968_b:192) establishes an argument for adopting simulation frameworks where available technological realisations [processes or techniques] are assessed in terms of both anticipated outcomes and combinations of linkages between available resources required for probable success. In accordance, an informative technology decision-agenda based on accurate forecasting can be formulated, providing information of alternative decisions correlating to appropriate technology types at the strategic planning level. Furthermore, it is proposed that socio-economic mariculture development initiatives should be assessed upon project appraisal methodologies involving broader social profitability criteria, as well as financial profitability to ensure economic sustainability. Finally, restraint needs to be exercised regarding planning complexity. Overtly refined econometric programming models rigidly framing development trajectories could be justifiably perceived as premature regarding the contemporary emergent status of the domestic mariculture industry, available institutional capacity, and practical applicability of such an approach.

6.8 Concluding Remarks

Planning provides a mechanism to anticipate future problems, resolve uncertainty, improve resource allocation and enhance decision-making capabilities. Although planning of the domestic mariculture industry is in its infancy stages, a selectively isolated approach has been adopted by MCM. This has lead to industry-specific planning that is removed from broader economic development policies. Implementation of a 'Nash sector plan' approach has lead to formulation of broad objectives to guide future industry development. The commencement of industry planning embraced a participatory ethos where there was significant stakeholder representation during objective formulation. Furthermore the importance of consolidating planning time horizons was acknowledged. As such, a medium-term rolling plan framework, guided by long-term perspective planned objectives and realised via annual implementation, afford both flexibility and operational feasibility for promoting mariculture industry growth.

However, lack of planning advancement detailing the specifics of annual planning generates concern. In accordance, aspects relating to decentralisation of planning, and potential adoption of a LED ethos to enhance stakeholder participation were discussed. Furthermore, these aspects represent important factors for realising mariculture development initiatives in peripheral coastal

localities. Operation within a multi-faceted decentralised framework affords the opportunity for appropriately delegating responsibilities among institutional co-ordinators and relevant government departments. It also reduces strategic information flows to manageable proportions and allows participatory involvement of all relevant stakeholders to be realised. As such, attainment of an integrated development framework for mariculture advancement requires greater attention to aspects of detailed planning and implementation. Improvements in development administration are thus important as MCM realises its facilitatory role in mariculture planning and development. Future institutional capacity building is thus required to ensure competent personnel, decision-making authority, and managerial skills are available for implementation of development programmes. Finally, recognition of the vital role industry assumes in planning motivates greater organisation between public planning implementation and private decision-making. As such, promoting industry 'buy-in' through complementary incentive-based approaches and plan announcement effects may offer useful additions in the formulation of future planning frameworks.

PART 3: Recommendations for Planning and Development of the South African Mariculture Industry

The final section seeks to progressively build upon firm foundations of theoretically grounded concepts based on contemporary industry reality. This protects presented recommendations and conclusions from being uncontextualised, baseless directives. In accordance, perspectives developed throughout the discourse are assimilated in an encompassing framework systematically conceptualising identified key economic and institutional variables. Specific attention is thus devoted towards aspects of enhancing technological development and transfer, greater provision of competitively priced financial capital, and broadening and deepening the human capital base. Furthermore, conceptualisations of forward-attached satellites are proposed as viable mechanisms for realising envisioned socio-economic mariculture development initiatives. Issues involving institutional variables of secure long-term property rights and positive transaction costs are also examined where attention is drawn to marketing and permitting. Finally, recommendations for integrated planning incorporating notions of decentralisation and echoing a LED ethos are presented. As such, the final chapter thus seeks to promote the opening of new process of investigative inquiry while simultaneously encouraging formulation of future action mechanisms to promote holistic integrated industry development.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The emergent domestic mariculture industry has become firmly entrenched as a dynamic contingent displaying high growth potential. Development impetus is supported by integrated legislative coastal development guiding principles articulated within the White Paper for Sustainable Coastal Development and realised in the MLRA of 1998. Adoption of the new integrated coastal management system involves a people-centred approach to sustainable coastal development, effectively replacing the previous resource-centred approach. Amendments to coastal legislation have been accompanied by institutional reformulation through establishment of MCM by DEAT. MCM has been tasked with domestic fishery management and development of the local mariculture industry. Recognition that mariculture should be developed in such a manner so as to maximise economic and social benefits has lead to creation of a demonstration project framework. This actively seeks to encourage collaborative public-private relationships promoting realisation of envisioned socio-economic mariculture development initiatives within previously marginalised coastal localities. Finally, the innovative capacity and commitment of commercial private-sector industry towards mariculture development has witnessed establishment of three producer associations. Of these, the AASA has gained governmental recognition as the official interest group representing industry.

Reorientation of the legislative-institutional framework has thus sought to create a supportive, facilitative and collaborative enabling environment for promoting mariculture development. The attention given to development of domestic mariculture is attributed to a number of factors. These include the general realisation that mariculture activities afford a realistic complement to strategically limited or retarded natural capture fishery growth (Nash, 1995_a:18). This is complemented by recognition that the South African industry displays inherent export growth potential to supply expanding global aquaculture markets with quality high-value produce. Furthermore, appropriate technology collaborative development initiatives afford scope for rural coastal locality welfare enhancement by generating alternative entrepreneurship-employment opportunities maximising the social and economic development impact of mariculture. However, for the inherent growth potential of the domestic mariculture industry to be realised, certain developmentally orientated aspects require further attention. Progressively building upon firm foundations of theoretically grounded concepts based on practical contemporary industry reality, the following chapter seeks to encourage formulation of future action to promote holistic integrated future industry development.

7.2 Development Aspects

7.2.1 Introduction

As Chapter 3 demonstrated, 28 entities are currently recognised as independent private mariculture firms, of which 21 were classified as operational by virtue of commercial production in the year 2001. Micro-economic firm structure of the emergent commercial domestic mariculture industry reflects centralised ownership functions associated with autonomous owner-entrepreneur or limited partnership entities. They display generic entrepreneurship characteristics of alertness and capacity for perceiving opportunity (Barreto, 1989:18). Although the structural simplicity of such organisational forms affords a high degree of responsive flexibility, constrained firm size in what was previously regarded a peripheral economic productive activity has historically limited financial capital access. Furthermore, the expansion potential of the industry was further constrained by the limited support afforded by the composite structure of prior institutional-economic systems. Cognisance of limited private-sector firm resources and consistent with facilitative legislative reformulation, collaborative organisational arrangements harnessing the beneficial outcomes of public-private partnerships will prove vital in realising the inherent domestic mariculture industry's development potential.

Achievement of virtuous industry development conforming to legislative coastal guiding principles requires a dedicated integrated capacity-building effort. This needs to encompass enabling technical-institutional organisational arrangements, development orientated economic transformation mechanisms, and an understanding of locality specific socio-cultural organisation. Furthermore, the effective utilisation of political spheres for planning and programme implementation where the state is required to occupy an active role in development rather than being relegated to a perceived free-market functioning impediment. The sheer magnitude involved in attempting to successfully formulate an integrated planning framework adequately amalgamating these diverse yet vitally important intricate development aspects in a practically employable manner is a vast task. This is further compounded by the need to avoid undue abstraction preventing the emergent framework from becoming a vague generalisation. Formulation of such an integrated planning framework clearly extends beyond the capacity of the discourse. In accordance, attention is devoted to providing illuminating recommendations for aiding in the promotion of strategic inter-related development variables, supplemented by the need for establishing decentralised institutional planning arrangements.

7.2.2 Technology

In Chapter 5, technology was conceptualised as evolving in a process-orientated manner. Technology was perceived as a succession of devices operating within a continuum that allowed shifts in existing production functions and the creation of new ones for realising efficiency increases by altering productive variable organisation. Furthermore, the conceptualisation of technology was extended to include broad-based notions of systematic knowledge application for

problem resolution. Within a general economic development framework, technology is seen as occupying a pivotal role in economic growth. Consequently, progressive collaborative technological development and dissemination is treated as an essential variable in promoting domestic mariculture industry growth.

The current MCM scientific research base complemented by commercial private sector industry innovative capacity endows the domestic mariculture contingent with significant scientifically orientated technological capacity. Indeed, the flexibility of the commercial contingent has enabled adoption of foreign technologies to locality-specific environments. Furthermore, firm-specific innovation has been incorporated as an instrument of competitive strategy. However, as previously mentioned, individual mariculture firms are not suited to sustain advanced R&D activities. As such, results from the interim national baseline reported that 24% of respondents called for increased governmental involvement in technology development and transfer activities (Hepburn et al., 2001:44).

Within the global sphere, governments assume an active role in aquaculture technology development. Countries whose governments have assumed such active roles by engaging in R&D activities include Taiwan, Chile, Israel, Nigeria, America, Norway, Japan, the Philippines, Singapore and Scotland (Hecht et al., 1992:19). As Chapter 5 further mentioned, success of France's national clam culture programme was based on dedicated state-funded projects and technology research (Flaasch, 1992:31). During the Workshop for Sustainable Development of Mariculture held in 1999, MCM targeted itself in becoming actively involved in fundamental and applied research in terms of development technologies. Furthermore, the organisation simultaneously sought to bring government in closer contact with the community (MCM, 1999c:94). Attainment of these objectives rests on development of a harmonious technology-institutional interface. This is particularly important in light of the channelling function institutions occupy when disseminating technology through their power structures. The traditional Veblen-Ayres dichotomy between rigid inhibitive institutions and technological progress were disregarded when contextualising the current situation in the local mariculture industry. Indeed, previous dealings between MCM and commercial industry over issues of disease control led to collaborative resolution of the red tides problem. However, sustained public-private partnerships are required for future development of technology with commercial application, and realisation of socio-economic development initiatives utilising appropriate technology.

In an attempt to promote realisation of technology partnerships, active industry and state participation is required. To ensure that research programmes adequately anticipate and satisfy relevant industry needs, a high level of industry participation in objective formulation is sought. Consistent with Australia's aquaculture development framework, industry participation in research

and development could be further encouraged through provision of tax concessions, grants and subsidies (WGA, 1994:70). Industry involvement is not only important for development of commercial technology applications, but is also instrumental in spreading innovation where incremental improvements lead to immediate returns in income. Realisation of envisioned mariculture development initiatives designed to alter dualistic development disparities in peripheral coastal localities require availability of appropriate technology. As previously mentioned, this technology has a time-space differential implying it may be highly context specific. As such, a high level of community involvement in these initiatives is thus required.

Adoption of an applied LED perspective seeking to address site-specific needs via locally appropriate solutions (Nel, 1999:1) further promoting collaborative private-public interaction is proposed. Furthermore, utilisation of historical hierarchical top-down technology transfer schematic frameworks for technological dissemination from centralised research institutions amongst envisioned socio-economic mariculture development initiatives are subject to review. Indeed, MacKay (1992:24) advocates adoption of a paradigmatic shift involving user-based perspectives. This is encapsulated in the Farming System Research [FSR] approach that stipulates “strong involvement of users in problem definition, elaboration of possible solutions and on-farm research ... [where] successful results are spread and tested via multi-location trials and pilot production programmes closely involving researchers and extension agents” (MacKay, 1992:24). As such, “recipients [are] therefore made active participants in both the process [of technology adaptation] ... and in evaluating the suitability of chosen technologies” (Costa-Pierce, 1992b:35). Advantages of utilising the on-farm approach include enhanced adoption rates of collaboratively developed technologies and potential cost reductions, as formal experimental stations are not required. Furthermore, they display greater effectiveness by focusing on farmer priorities (Ali, 1992:56). In accordance, the approach is consistent in addressing calls for “dissemination of research results in a form usable by producers and planners, not just scientists” (New et al., 1995:18).

However, Leelapatra et al. (1992:59) report disadvantages include logistical constraints associated with transportation and communication, insufficient on-farm environment control causing measurement and accuracy difficulties, and limited beneficiary participation when experimental activities are perceived to be high-risk. In addition, higher education levels and societal influence largely induce beneficiaries’ acceptance of technology. Targeting of respected community leaders is thus advocated as a potential medium for promoting technology acceptance and rapid dissemination (Ali, 1992:57). This draws on previous discussions of utilising a community leader-based extension agent programme for technology diffusion (Whyte, 1991:183) to promote shared project ownership and broad participation. As such, the research agenda becomes one of learning more about locality-specific complex economic-social-cultural system interaction and targeted

beneficiaries' decision-making processes orientated towards risk minimisation with limited resources. Furthermore, it provides significant scope for harnessing indigenous knowledge and establishing viable points of strategic development intervention (MacKay, 1992:24).

7.2.3 Financial capital

As previously mentioned, one of the constraints limiting industry expansion relates to inadequate competitively priced financial capital availability. The urban bias of formal financial lending institutions motivated by perceived risk and high information costs of assessing development-orientated projects renders ordinary banking institutions as inadequate finance sources for development programmes. In the absence of many alternatives, limited resources for broadening and deepening production structures hamstring the mariculture industry. Furthermore, there is limited financial capital available for funding practically-orientated human capital development, and financing research-orientated technical progress supplemented by adoption of existing knowledge for further commercial application and appropriate technology development initiative realisation through product, process and material innovation. The dependence of capital usage upon institutions' traditional heritage and economic agents' habit-patterns of thought and action (Meier, 1965:110) requires establishment of financial organisational frameworks directed towards mariculture industry development as guided by current coastal development policy. In accordance, greater mariculture orientated portfolios in development financial systems is sought in a bid to lower financial resource costs for investors, reduce risk and improve resource allocation preventing capital misuse, loss of opportunity and economic waste.

In accordance with current macro-economic policy, cautionary FDI attraction presents a feasible option when accompanied by technical assistance and training possibilities. Such options may be particularly appealing when prospective joint venture arrangements incorporating domestic firms affords viable opportunities for enhanced local entrepreneur access to technology, expertise and markets. Although general MNE critique was disregarded as subjective generalisation, FDI attraction should nonetheless be underscored by a cautionary approach. This recognises the need for thorough economic welfare benefit analysis individually assessing potential FDI operations, including delineation of technology transfer and skill acquisition arrangements.

The present structure of formal commercial financial institutions renders them ill-suited to competently serving members of the general rural population and financing development initiatives (Goulet, 1985:288). An argument can thus be formulated for establishing rural credit extension services in a bid to address the effects of financial dualism. Democratically owned co-operatives built on mutual self-help premises utilising interest group collective savings (Levin, 1996:33) where acknowledged. Acceptance of mutual indefinite liability allows members to become credit worthy and obtain acceptable interest rates. However such notions of envisioned mariculture

development initiative finance require revision in cognisance of prevailing socio-economic reality. It was noted that failure of traditional borrower-dominated rural credit extension programmes perceiving the poor as unable to save and unresponsive to savings incentives is largely due to ignoring transaction costs and deposit generation (Spio & Groenewald, 1997:123-127). Consequently market-performance views emphasising deposit mobilisation attached to positive real interest rates and autonomous rural financial market development offers a viable alternative. Furthermore, market performance-based credit extension services generally circumnavigate fundamental public welfare issues regarding risk incidence concerns involved with subsidised interest rates or government surety for development operations. Such rural credit extension services may be particularly successful when linked to appropriate technology initiatives generating favourable production investment returns. However, implementation of these programmes is subject to resolution of complex institutional arrangements and creation of effective distribution mechanisms, and is considered a long-term policy initiative.

Attempts to generate alternative non-collateral financing approaches suited to community orientated mariculture initiatives extending beyond traditional development and community banking systems are thus important. This may hold particular significance for future formulation of envisioned CPP development initiatives. The FAO (2001c:4) advocates potential use of land as collateral subject to prevalence of a satisfactory legal and regulative environment recognising transferable land titles as surety. In probable instances of governmental or communally owned land negating the presence of clearly defined enforceable individual property rights, tentative use of land titling effectively establishing a portion of group land to stand as collateral may be considered. However, impediments include “political and social sensitivity as changes are likely to involve conflicts of interest, transaction costs and friction “ (FAO, 2001c:4) requiring the presence of a co-operative spirit, collective participation and unified belief in project success.

Finally, if government is committed towards realising the inherent growth potential of the commercial contingent while seeking to maximise social and economic benefits from mariculture activities, state resources need to be devoted towards establishing catalytic supportive financial organisational arrangements. This may ultimately involve formulation of a development bank to provide impetus for mariculture advancement, specifically designed to meet the needs of the commercial private sector and socio-economic programmes. However, in the short-term, the mariculture portfolios of existing development lending institutions need to be expanded. Furthermore, enhanced connections with facilitatory organisational structures previously discussed will further improve institutional support available to the mariculture industry, linking financial capital to viable ventures.

7.2.4 Human capital

For realisation of rapid holistic industry development, greater financial capital availability needs to be effectively complemented by measures addressing knowledge and skill deficiencies facilitating establishment of suitable institutional and productive frameworks. Based on the accepted notion of positive economic returns from schooling (Taylor & Yunez-Naude, 2000:287) where investment in education generally provides favourable social rates of return (Zuvekas, 1979:154), emphasis is required on effectively combining aspects of formal education and practical skill acquisition programmes. This is required to address commercial industry's call for skilled labour and an improved human capital base (Hepburn et al., 2001:41). Furthermore, education programmes tied to appropriate technology mariculture development initiatives will provide training essential for realising project success. In addition, such programmes may also afford the opportunity for achieving greater productive output and increased equity if attention is paid to special development needs. As such, investment in human capital is required.

In response to the current skills shortage, commercial private sector mariculture firms conduct on-the-job training that is firm specific. The variety of skill levels and competence required is confirmed by Britz et al. (1999:19), who report that although skill acquisition for shore based grow-out operations can be readily assimilated via on-the-job competency based training, "mariculture ranching requires a competency in diving [involving] extensive training in underwater diving techniques ... and basic commercial skills which demand a certain level of education". As such, the need for tertiary and vocational training has been prioritised by MCM (MCM, 1999c:135). In Australia, the WGA (1994:19,25) recommended integration of short-term courses for practical training with tertiary curricula in a bid to create skilled personnel for development of the aquaculture industry. Unfortunately, in South Africa little has been done to achieve a viable mariculture training framework. Current institutional inability to develop training programmes beyond hypothetical objectives demonstrates the need for greater training programme analysis and aspect diagnosis. This is required for establishment of the appropriate scope and nature involved with programme formulation, complemented by an urgent need for greater pro-active MCM co-ordination.

It is important to acknowledge that skills development programmes need to be firmly based upon practical knowledge assimilation. Industry is willing to contribute material towards creation of a knowledge base that can be integrated with formal education to establish an accredited mariculture certificate (Hepburn et al., 2001:32-33). Industry involvement in establishing course composition and structure is imperative to ensure creation of practically employable modular teaching courses. Collaborative partnerships are thus required between tertiary institutions, MCM and industry for implementing and funding such initiatives. This is particularly important if practical training is to be formalised via a general apprenticeship programme co-financed by employers. Furthermore,

policy implications may exist if future agreements are reached such that workers accept temporarily reduced wages during technical training to offset costs.

7.2.5 Socio-economic development

It was acknowledged a myriad of variables are involved with effective establishment of mariculture development initiatives orientated towards maximising social and economic benefits in peripheral coastal localities. Consequently, Chapter 5 focused attention on conceptualisations of CPP initiatives, as attempts to construct specific development frameworks would present themselves as nothing more than abstract directives. Notions of agro-aquaculture subsistence farming systems are often advocated for rural development where cultivation is orientated towards satisfying nutritional dietary needs. However, as previously mentioned, creation of a mariculture development framework based on a subsistence system was described by MCM as infeasible. Furthermore, the economic implementation of such systems proves difficult in practice due to a need for daily management, continuous surveillance and compatibility of programmes with traditional lifestyles.

Culture based systems offer a wider range of opportunities for community-based projects and enhanced use of coastal resources. Furthermore, the approach may afford small-scale and subsistence fishers opportunities for market integration as the technology employed is “transitional between hunting and farming ... [being] intermediary in the evolutionary process of technological change transforming fishers to farmers” (Balarin, 1997:2). This system thus harnesses the strengths of both mariculture and the traditional capture fishery. However, implementation of these frameworks requires strategic combinations of private property management during fingerling rearing and common property management at the time of recapture (Ungson, 1993:11). Furthermore, applicable technology, strong levels of government commitment, secure finance and democratic beneficiary organisational structures are essential. As such culture based systems must be regarded as a potential long-term initiative requiring consolidation of a complex institutional-legal environment required for their success.

Establishment of CPP arrangements involving satellite operations attached to commercial industry thus represent a more attainable option. This is particularly apt in light of the emerging status of the domestic industry, which is characterised by resource shortages, and evolving frameworks. An opportunity-orientated environment needs to be established allowing marginalised coastal communities to engage in wealth generating activities to counteract “the major cause of inequality and poverty [in democratic South Africa arising from] the failure of the economy to create jobs” (Standing & Sender, 1996:19). Realisation of envisioned socio-economic mariculture industries loosely structured upon a semi-intensive small-scale commercial system hybrid are contingent

upon broadening government's stance beyond demonstration project frameworks and increasing resources devoted to such initiatives. Envisioned parent satellite-operations will effectively create a hybrid co-operative organisational mode blending market forces with of elements collective organisation. However, vertical integration provides scope for independent operation, allowing satellite operators to use idiosyncratic knowledge to improve their productivity. Although commercial industry has limited knowledge of CPP relationships, many operations are potentially willing to become involved with suitably skilled candidates (Hepburn et al., 2001:34). As previously mentioned, areas of expertise available display contingent specific variation and cover many spheres from knowledge dissemination and business planning to marketing facilitation.

However, realisation of CPP satellites is dependent upon fostering strategic workable partnerships between relevant stakeholders. To facilitate targeted beneficiary buy-in, an argument has already been established for the adoption of a LED framework displaying a paradigmatic shift towards post-modernistic thought emphasising uniqueness and local autonomy (Nel, 1999:5). The approach recognises the importance of community participation to circumnavigate socio-cultural and locality specific development constraints. Indeed, Bamberger (1986:9) reports that active participation improves project design by enhancing productive use of local knowledge, increasing the programme's social acceptance by aligning project operations with procedures familiar to local rural communities (Lele, 1975:128). However, it is important to recognise "successful grassroots projects are contingent upon leadership, relevance to response of felt needs, resource availability, optimal management of early projects and initial success" (Ibrahim, 1995:30).

Aside from the need for active beneficiary involvement, a clearly articulated framework requires development that provides economic incentives for commercial industry to become involved in collaborative CPP relationships. Creation of such a framework should be done with industry input to ensure provision of feasible economic incentives attractive to commercial industry. As the lead agency for promoting mariculture development while seeking to maximise social and economic benefits, MCM has an important future co-ordinating and initiating role to play. It is thus imperative that close collaborative working relations are fostered between MCM, governmental spheres particularly at the local level, private sector stake holders and targeted beneficiaries to promote integrated project implementation, monitoring and continuous support.

7.3 Institutional Aspects

7.3.1 Property rights

The composition, structure and nature of property rights were regarded as an essential variable in the development process. Property right delineation affects decision-making regarding resource use, economic behaviour and performance. Property rights effectively establish the foundations

for permissible collective action “support[ing] and protect[ing] individuals as they exercise their liberty” (Dugger, 1980_b:51) by regulating the nature of others’ activities. As such, well defined perpetually evolving property rights enable the protection and dynamic expansion of equality and opportunity. From the perspective of promoting growth in the domestic mariculture industry, dynamically expanding equality in opportunity becomes essential when adopting an evolutionary view of unleashing the growth and socio-economic welfare potential of mariculture activities.

The need for well-defined long-term property rights has already been highlighted. Indeed, recognition of the vital role property rights occupy in sustained development has led to a review of current annual mariculture rights to be replaced by application for a 15-year right (MCM, 1999_c:79). However, it is important that secure long-term property rights incorporate the flexible right of transfer, inducing the holder to engage in long-term planning horizons. As such, identification of specific areas earmarked for mariculture development are based on MCM’s coastal development GIS framework. However, attenuation exclusively restricting coastal land usage for potential future mariculture activities implies a shrinkage in general economic asset value in instances of alternative usage (Furubotn & Richter, 1991:6). Nonetheless, use of mariculture zoned areas offers feasible guidance in establishing a long-term development strategy.

Apart from the induced risk reduction impact of defined long-term anticipated land-use mariculture rights regarding investment strategies, legislative power endowing MCM with significant right granting authority affords the organisation with significant influence in shaping future economic progress and development trajectories through future right delineation to expand dynamic equality in opportunity. Long-term rights establish action parameters co-ordinating economic agent behaviour through enforced working rules (North, 1984_b:203). This directly contributes towards preventing opportunism where resultant collective action enables liberation and expansion of the mariculture industry beyond levels permitted by individual action. In addition, legal-institutional structures for delineating secure property rights hold specific importance for realisation of CPPP development initiatives incorporating communal land and collective action. Finally, clearly defined long-term transferable property rights enable feasible use of economic incentives promoting growth (Furubotn & Richter, 1991:7). As such, a strong future role exists for MCM with regard to effectively combining mariculture zoning with legal-institutional organisational frameworks involved with lease and right allocations.

7.3.2 Transaction costs

As previously mentioned, the market is a co-ordinating and structuring mechanism allowing exchange transactions to occur. However, the presence of positive transaction costs emerge to the extent contracts need to be enforced to prevent opportunism and value attributes in the exchange process remain unspecified. As an institutional body, MCM’s current limited co-

ordination of mariculture agents occurs through the enforcement of working rules and property rights. However, in a bid to promote mariculture development and reduce positive transaction costs associated with information search, dissemination of market opportunities by MCM to industry was presented. The value of accessible information is particularly important as simplistic rationality maximising models based on perfect knowledge or easily estimable alternatives become discarded. As such, the important role of institutional co-ordination and economic agent learning has been recognised (Hodgson, 1989:5).

The success of co-ordinating programmes is dependent upon ability to organise and exploit essential information via an effective communication process (Campbell, 1987:17). Direct links with mariculture operators are required to ensure an understanding of micro-economic system change and growth, contributing to formulation of planning processes. Furthermore, effective communication mechanisms will ensure evaluative informative feedback to MCM regarding agents' responses. Such mechanisms need to be designed in a manner that is sufficiently sensitive to individual concerns ensuring feedback is reflective and accurate. Use of regular discussionary forums or creation of a sub-department within MCM accessible to industry may offer future scope for improving communications. However, the extent to which informational decentralisation is viable is dependent upon processing and communication costs (Hurwicz, 1990:324).

7.3.2.1 Permitting

Permitting represents an area where greater contact between MCM and industry is vital. MCM has listed streamlining existing permit processes within relevant regulatory agencies to promote greater administrative efficiency as a strategic objective (MCM, 1999c:133). However, poor delivery has ensured permit acquisition remain problematic for commercial industry members (Hepburn et al., 2001:42). Indeed, industry concerns regarding bureaucratic-related institutional deficiencies within MCM are evident in lengthy application approval time periods, limited feedback and general disinterest (Hepburn et al., 2001:40-42). In accordance, improved institutional management regarding permit service delivery may require further understanding of the dynamic complex internal nature of the institutional-legal permit process itself. The prevailing system could be analysed in terms of its evolutionary high-order, multiple loop non-linear structures if root problems moving beyond superficial symptom treatment are to be solved (Forrester, 1968:243). Furthermore, dedicated attention needs to be directed towards realising industry's support for a semi-autonomous one-stop permitting institution (Hepburn et al., 2001:43) fast-tracking general mariculture production permit applications and ensuring timeous granting of export permits. If the situation remains unresolved, produce may be exported 'illegally' in the absence of timeously granted permits. Although cultivated produce may be suitable for human consumption, the absence of applicable permits may create doubt regarding produce quality and health standard

compliance. Possible occurrence of such events due to institutional inefficiency may unnecessarily undermine development of the domestic mariculture industry.

7.3.2.2 Marketing

As previously noted, MCM has recognised its role in encouraging value-added activities and diversified expansion of the mariculture industry (MCM, 1999c:136). Consequently, formulation and dissemination of marketing strategies was discussed where it was noted that such strategies need to incorporate opportunities for mariculture development initiatives. Although value-added analysis is a large component of marketing strategies, cognisance of prevailing health standards in target markets are also important. An additional aspect involving evaluation of future potential markets is thus consistent with notions of 'quality consumers'. Importing countries' food safety requirements need to be acknowledged where export-orientated supply chains are reliant on high-value foreign markets congruent with domestic mariculture firms' orientation towards realising increased exports. This becomes specifically important when production systems are largely divorced from satisfying local consumption. With increased liberalisation of traditional trade restrictions, Henson et al. (2000:1159) argue that attention has been focused on technical food composition and safety regulations "reflect[ing] wider recognition that technical measures can act, either explicitly or implicitly, as barriers to trade in a similar manner to tariffs and quantitative restrictions". By drawing upon the experience of Kenya's fish exports from Lake Victoria to the EU, Henson et al. (2000:1167) demonstrate the detrimental impact of how limited resource constraints constraining ability to comply with hygiene requirements, effectively restricting Kenyan exports. This has led to severe economic implications regarding prolonged fish export prohibitions. MCM has prioritised criteria revision regarding shellfish sanitation agenda by introducing a water quality monitoring programme promoting South African seafood commodity acceptance in the EU (MCM, 1999c:134-135). However, it is imperative that planned future establishment of socio-economic mariculture development initiatives within peripheral coastal regions are integrated within food safety production frameworks, ensuring realisation of domestic and foreign market access.

7.4 Planning

Planning provides a mechanism to anticipate future problems, resolve uncertainty, improve resource allocation and enhance decision-making capabilities. As previously noted, planning of the domestic mariculture industry is currently in its infancy stages. MCM has elected to adopt a selectively isolated approach to mariculture planning that is removed from broader economic policy. This has allowed focus to be concentrated on mariculture industry planning and development. Planning commenced in 1999 at a national workshop and involved discussions by a large representation of stakeholders with vested interests in mariculture advancement. Discussions culminated in thematic integration of major issues, leading to identification of broad

objectives to guide future industry development. However, although national workshop discussions presented a foundation for industry planning, guiding objectives have yet to evolve into an integrated development framework. Ambitious time-specific recommended activities and stakeholder responsibilities generally remain unrealised.

As such, attention needs to be directed towards realising and implementing a holistic development framework. It is proposed that this could be facilitated through greater decentralisation in a bid to reduce information amassing, manipulating and processing difficulties experienced by the single planning agency. Furthermore, decentralisation may play an important future role in helping MCM to maximise social and economic benefits associated with envisioned mariculture development. Adoption of a LED ethos reflecting the values of individualism, uniqueness and local autonomy could become important as applied development strategies for addressing context-specific issues (Nel, 1999:1) are sought. By paying attention to social and individual needs to preserve local democracy and autonomy, planning objectives do not become unqualified uni-dimensional goals (Hodgson, 1989:271) as development is not solely conceptualised as a system. Rather it incorporates people with initiative, insight and drive (Claassen, 1994:18). As such, the emergent framework establishes provision for greater base-level stakeholder participation in project formulation (Zuvekas, 1979:198). Furthermore, active encouragement of private sector industry stakeholder participation promoting constructive dialogue regarding perceived development needs is required. Industry can make a substantial contribution in establishing an integrated programme for applying a system of state interfaces with the play of market forces by drawing upon private sector practical experience with market realities (Honey, 1970:107).

Use of Nash's (1995_a:82-83) proposed time horizon planning perspectives where employment of medium-term rolling plan frameworks complemented by flexible iterative annual revisions detailing budgetary expenditure and immediate goals are supported. Furthermore, MCM's rejection of complex planning models in light of emergent industry status is acknowledged (MCM, 1999_c:125). However, attention needs to be dedicated towards annual planning to provide impetus for industry development. Announcement effects could facilitate increased harmonisation between public planning implementation and private decision-making. Furthermore, Hodgson (1989:268) argues "the existence of some degree of economic planning may also provide entrepreneurs with a sense that although their own product may or may not be accepted, there is likely to be a general demand for product of their type", thereby promoting innovation. Apart from development and institutional aspects focused upon in the discourse, the emergent planning framework needs to incorporate a pro-active extension service network linking industry and public sector co-ordinating bodies. In Australia, extension services are regarded as occupying "an important role in the resolution of production problems, productivity improvement, disease management and the transfer of new technology" (WGA, 1994:20).

Finally, mariculture industry planning is ultimately the responsibility of the lead agency thereby charging MCM with a co-ordination role in formulating and actively implementing a plan. Improvements in development administration directed at improving public agency organisation and competence (Gant, 1966:382) are vital. Future institutional capacity building is thus required to ensure competent personnel, decision-making authority and managerial skills are available for programme implementation. This would establish an appropriately formulated responsive institutional system for the realisation of planned change within the domestic mariculture industry.

7.5 Concluding Remarks

Recent coastal legislative reformulation has led to implementation of the MLRA in 1998. This has been accompanied by organisational restructuring leading to the creation of MCM, tasked with mariculture development. As such, a foundational facilitatory enabling legal-institutional environment has been established for promoting sustainable coastal development in South Africa. The emergent domestic mariculture contingent has established itself as a dynamic industry displaying potential for structural transformation into high growth activities. Furthermore, mariculture has been identified as a mechanism for maximising social and economic benefits in previously marginalised coastal localities in a bid to address dualistic development disparities. However, expansion and diversification of activities remain constrained by the absence of an integrated development framework. If the development potential of the industry is to be realised, attention needs to be given to strategic economic development and institutional variables. Finally industry advancement rests on formulation of collaborative participatory partnerships where further impetus for mariculture development requires a pro-active stance by MCM and relevant stakeholders.

Appendix 1: 2001 National Mariculture Baseline Survey Questionnaire

SECTION 1

1.1. Business and Infrastructure Particulars

1.1.1. Operating licenses:

Please circle most appropriate response

- ☐ 1. Abalone
- ☐ 2. Oyster
- ☐ 3. Mussel
- ☐ 4. Fish
- ☐ 5. Seaweed
- ☐ 6. Prawn
- ☐ 7. Other (please specify)

1.1.2. Operating sector:

Please circle most appropriate response

- ☐ 1. Shore-based abalone farming
- ☐ 2. Abalone ranching
- ☐ 3. Oyster farming
- ☐ 4. Mussel farming
- ☐ 5. Fish farming
- ☐ 6. Seaweed farming
- ☐ 7. Prawn farming
- ☐ 8. Other (please specify)

1.1.3. Business type:

Please circle most appropriate response

- ☐ 1. Close corporation
- ☐ 2. Trust
- ☐ 3. Company [Pty.]
- ☐ 4. Other (please specify)

1.1.4. Shareholder profile:

Please complete table below

Shareholders: State whether natural person, trust, company or other legal entity	% Shares held	Race of shareholder if applicable	Sex of shareholder if applicable
Shareholder 1			
Shareholder 2			
Shareholder 3			
Shareholder 4			

1.1.5. Location of Operations:

Province:

District/Town/City:

1.1.6. Nearest Rural Coastal or Subsistence Community:

.....

SECTION 2 – OPERATIONS

2.1. Initiating operations

2.1.1. Commencement date of operations:

2.1.2. What were the major constraints you faced when starting the enterprise :

- **Circle most appropriate response(s) left column**
- **Indicate difficulty level of constraint(s) right column using the following rating scale:**

1 – Nearly impossible

2 – Very difficult

3 – Difficult

4 – Easy

5 – Very easy

Constraint	Difficulty level
1. <i>Financial</i>	
2. <i>Locational</i>	
3. <i>Technological</i>	
4. <i>Logistical</i>	
5. <i>Permitting</i>	
6. <i>Skilled labour</i>	
7. <i>Other (please specify)</i>	

2.2. Current Operations

2.2.1. Current commercial production :

Please complete table below

Species name (in order of importance)	Common name	Technology used	% Capacity utilisation ¹
1			
2			
3			
4			
5			

¹ How much of current production capacity (i.e. Infrastructure - tanks, rafts, ponds) is being utilised.

2.2.2. Production information

Please complete table below :

- Table code :

MI – marketed internally i.e. by the business itself

ME – marketed externally i.e. by another distributor

TAPCs – total average production costs

LC – labour costs

TC – transport costs

PC – processing costs

RC – Running costs

	Species	Product	Year production began	Average unit price per kg [raw product basis]	Quantity produced in 2000 [tons raw product]	Total costs per kg produced incl. processing	% of TAPCs per kg accruing to ...
Current/ new products				1 – MI R..... 2 – ME R.....			1 – LC.....% 2 – TC.....% 3 – PC.....% 4 – RC.....%
				1 – MI R..... 2 – ME R.....			1 – LC.....% 2 – TC.....% 3 – PC.....% 4 – RC.....%
				1 – MI R..... 2 – ME R.....			1 – LC.....% 2 – TC.....% 3 – PC.....% 4 – RC.....%
				1 – MI R..... 2 – ME R.....			1 – LC.....% 2 – TC.....% 3 – PC.....% 4 – RC.....%

2.3. Previous Operations

Please complete table below only if you have ceased production of a previously produced species and/or product:

Species name	Common name	Technology used	% Capacity utilisation
1			
2			
3			
4			
5			

2.4. Markets

2.4.1. How did you perceive the market conditions for your principal product during the following years:

Please circle most appropriate description(s)

Year 1998	Year 1999	Year 2000
1. Turbulent	1. Turbulent	1. Turbulent
2. Unstable	2. Unstable	2. Unstable
3. Stable	3. Stable	3. Stable
4. Rapidly Growing	4. Rapidly Growing	4. Rapidly Growing
5. Growing	5. Growing	5. Growing
6. Declining	6. Declining	6. Declining

2.4.2. Source of Demand:

Under "Main Demand Source" please use the following code:

E – Export/ overseas

D – Domestic

A – Other aquaculture operations

O – Other [please specify]

Species name	Year	Main demand source
	1998	
	1999	
	2000	

2.4.3. Predicted Future Annual Output [in tons]:

Please complete table below

Species	Year	Annual Output [tons]
	2001	
	2002	
	2003	
	2004	
	2005	

2.5. Environmental Impacts

2.5.1. Was an environmental impact assessment conducted before initiation of your operations :
Please circle most appropriate response

- ☐ 1. Yes
☐ 2. No

2.5.2. If “Yes”,

- ☐ when did this occur :
☐ what did it cost :R

2.5.3. Did you build any facilities or design protocols to reduce the environmental impact of your operations?

Please circle most appropriate response

- ☐ 1. Yes
☐ 2. No

2.6. Quality Control

2.6.1. With respect to quality control of your output (effluent/product or both), do you send samples to be tested (eg. PSP, microbial, water quality testing etc.) :

Please circle most appropriate response

- ☐ 1. Yes
☐ 2. No

2.6.2. If “Yes”,

Please complete the table below

Test	Sampling intervals	Approximate annual cost
1.		
2.		
3.		
4.		
5.		

SECTION 3 – FINANCIAL DATA

3.1. Investment Capital

3.1.1. Initial start-up costs (capital and operating costs) until positive cash flow achieved:

R

3.1.2. Initial investment sources:

Please circle most appropriate source

- ☐ 1. Domestic investment/loans
- ☐ 2. Foreign direct investment
- ☐ 3. Foreign aid
- ☐ 4. Government assistance
- ☐ 5. Private equity/ venture capital
- ☐ 6. Other (please specify)

3.1.3. How difficult was it to obtain such funding

Please circle most appropriate description

- ☐ 1. Nearly impossible
- ☐ 2. Very difficult
- ☐ 3. Difficult
- ☐ 4. Easy
- ☐ 5. Very easy

3.1.4. Current investment sources:

Please circle most appropriate source

- ☐ 1. Domestic investment/loans
- ☐ 2. Foreign direct investment
- ☐ 3. Foreign Aid
- ☐ 4. Government Assistance
- ☐ 5. Private capital
- ☐ 6. Other (please specify)

3.2. Economic valuation

3.2.1. Market value of total enterprise: R

i.e. what the owner would receive from the sale of the entire business if sold on the open market

3.2.2. Replacement value of capital equipment: R

3.2.3. Market value of capital equipment: R

3.2.4. Gross income per annum:

Please complete table below

Year	Income per Annum [Rands]
1996	
1997	
1998	
1999	
Last year [2000]	

3.2.5. Gross annual costs:

Please complete table below

Year	Costs per Annum [Rands]
Last year [2000]	

3.2.6. Wage Costs per annum:*Please complete table below*

Year	Salaries/wages per Annum [Rands]
Last year [2000]	

3.2.7. Approximate monetary value invested privately in Research and Development (R&D) of currently cultivated species since operation began (if possible):*Please complete table below*

Year	Species name(s)	R & D value [Rands]
From beginning of operation to 1999		
Last year 2000		

3.2.8. How many incremental innovations [which could or are used to improve production efficiency] have you made since commencing operations :*Please circle most appropriate answer*

- ☐ 1. None
☐ 2. One
☐ 3. Two
☐ 4. Three
☐ 5. Four
☐ 6. More than five

3.2.9. How many of these innovations have you adopted in your current production processes:*Please circle most appropriate answer*

- ☐ 1. None
☐ 2. One
☐ 3. Two
☐ 4. Three
☐ 5. Four
☐ 6. More than five

3.3. Permits and Licensing**3.3.1. Current permitting/licensing/levy costs:***Please complete table below*

Permit/license/levy name [national & regional]	Price	Renewal period	Renewal fee [if any]

3.3.2. Do you perceive the current permit/license fee to be:*Please circle most appropriate response*

- ☐ 1. Excessively high
☐ 2. High
☐ 3. Acceptable
☐ 4. Low
☐ 5. Excessively low

3.3.3. How easy was it to acquire the necessary permits/licenses:

Please circle most appropriate response

- ☐ 1. Nearly impossible
- ☐ 2. Very difficult
- ☐ 3. Difficult
- ☐ 4. Easy
- ☐ 5. Very Easy

3.3.4. What are the major problems you have encountered in acquiring licenses:

3.3.5. In your opinion, how do you think these problems can be reduced/overcome:

Please circle most appropriate response

- ☐ 1. Improved administration, eg. A one stop aquaculture desk within MCM that facilitates all internal processes
- ☐ 2. Creation of a contracted out "one-stop" permitting and licensing institution
- ☐ 3. Better communication between MCM and aquaculture industry
- ☐ 4. Other (please specify)

3.3.6. In an attempt at improving permit/license service delivery, the "User Pays Principle" is being examined. If these finances were raised fully/partially by industry and utilised to create a "one-stop" permitting/licensing institution that could be phased in over time, would you support the initiative:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

3.3.7. How do you feel that such an institution should be financed:

Please circle most appropriate response

- ☐ 1. Paid for exclusively by government
- ☐ 2. Mostly by government
- ☐ 3. Government subsidies until sufficient new entrants have been attracted to lower costs
- ☐ 4. 50 – 50 partnership between both
- ☐ 5. Mostly by industry
- ☐ 6. Paid for exclusively by industry
- ☐ 7. Other (please specify)

3.3.8. Would you be willing to pay more for a permit/license in exchange for improved administration:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

3.3.9. If "yes", then how much more than your current permit/license costs would you be willing to pay:

Please circle most appropriate response

- ☐ 1. 50%
- ☐ 2. 100%
- ☐ 3. 500%
- ☐ 4. 1000%
- ☐ 5. Other (please specify)

Questions 3.3.10 to 3.3.14 are only applicable to Portnet water lease users

3.3.10. Portnet open site water lease [Port Elizabeth and Salhadana Bay]:

Please complete table below

Lease price	Lease period	Renewal fee (if any)

3.3.11. Does the lease include any external benefits or services (e.g. Insurance against theft etc.):
Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

3.3.12. If “yes”, please list the benefits:

.....

.....

.....

.....

3.3.13. Do you perceive the lease to be fair:
Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

3.3.14. If “No”, please state why:

.....

.....

.....

SECTION 4 – LABOUR

4.1. Labour force profile

4.1.1 Number of current employees:

For the column “Monthly Salary/Wage Costs” please use the following code:

1 – Less than R1000 per month

2 – Between R1000 and R2000 per month

3 – Between R2000 and R5000 per month

4 – Between R5000 and R10 000 per month

5 – Between R10 000 and R15 000 per month

6 – More than R15 000 per month

For the column “Racial Group” please use the following code:

A – Asian

B – Black

C – Coloured

I – Indian

W – White

Job description	Monthly salary/wage	Sex	Racial group	Number employed	Daily working hours
Labourer					
Skilled labourer					
Middle services (administrative support, personnel, middle management)					
Artisan					
Professional (senior management, degreed personnel)					

4.1.2. Approximate percentage of current employees sourced from local poor coastal communities:

.....

4.1.3. Approximate percentage of current employees sourced from migrant labour (and where do they come from if known):

.....

4.1.4. Approximate percentage of current employees sourced from contingency/temporary labour:

.....

4.2. Work Ethic

4.2.1. Is overtime needed:

Please circle most appropriate response

- ☐ 1. Almost always
- ☐ 2. Frequently
- ☐ 3. Sporadically
- ☐ 4. Hardly ever
- ☐ 5. Never

4.2.2. General attitude of employees towards work:
Please circle most appropriate response

- ☐ 1. *Enthusiastic*
- ☐ 2. *Motivated*
- ☐ 3. *Indifferent*
- ☐ 4. *De-motivated*
- ☐ 5. *Apathetic*

4.2.3. Level of absenteeism:
Please circle most appropriate response

- ☐ 1. *Excessively high*
- ☐ 2. *High*
- ☐ 3. *Acceptable*
- ☐ 4. *Low*
- ☐ 5. *Very low*

SECTION 5 – DEVELOPMENT

5.1. Development potential and expansion plans

5.1.1. Do you have any current expansion plans for existing production facilities or the creation of new facilities:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

If “yes”, please state the:

- Basic nature of the project:

.....

- Operating sector:
- Estimated value of the project: R
- Estimated time frame for implementation (in years):

Please circle most appropriate response

- ☐ 1. Do not know
- ☐ 2. 1 year
- ☐ 3. 2 years
- ☐ 4. 3 years
- ☐ 5. More than 3 years (please specify).....

- Number of new potential jobs to be created:

Please circle most appropriate response

- ☐ 1. Do not know
- ☐ 2. None
- ☐ 3. Less than 5
- ☐ 4. Between 5 and 10
- ☐ 5. More than 10 (please specify).....

5.1.2. Have you invested in the R&D of any experimental species:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

5.1.3. Once the species you have been researching is ready for commercial mariculture production, how capital-intensive do you think production will be:

Please circle most appropriate response

- ☐ 1. Very high
- ☐ 2. High
- ☐ 3. Moderate
- ☐ 4. Low
- ☐ 5. Very low
- ☐ 6. Do not know

5.1.4. Once the species you have been researching is ready for commercial mariculture production, do you think production will require:

Please circle most appropriate response

- ☐ 1. A high level of technical competence
- ☐ 2. A moderate level of technical competence
- ☐ 3. A low level of technical competence
- ☐ 4. Do not know

5.1.5. Once the species you have been researching is ready for commercial mariculture production, how labour-intensive do you think production will be:

Please circle most appropriate response

- ☐ 1. Very high
- ☐ 2. High
- ☐ 3. Moderate
- ☐ 4. Low
- ☐ 5. Very low
- ☐ 6. Do not know

5.1.6. Once the species you have been researching is ready for commercial mariculture production, where do you anticipate your main market:

Please circle most appropriate response

- ☐ 1. Export
- ☐ 2. Domestic
- ☐ 3. Other aquaculture operations
- ☐ 4. Other (please specify)

5.1.7. What is the projected market value per kg of the species you are researching:

R

5.1.8. Do you think the current level of government investment in mariculture R & D is sufficient:

Please circle most appropriate response

- ☐ 1. Definitely not
- ☐ 2. Somewhat lacking
- ☐ 3. Acceptable
- ☐ 4. Too much
- ☐ 5. Do not know

5.1.9. In which specific areas do you think government should assume a more pro-active role:

Please circle most appropriate response

- ☐ 1. Facilitating finance and investment
- ☐ 2. Technology development and transfer
- ☐ 3. Better administrative support
- ☐ 4. Better extension services
- ☐ 5. Sector planning and resourcing
- ☐ 5. Other (please specify)

5.2. Labour force development programmes

5.2.1. Is there is a need for a qualification from an externally accredited aquaculture institute that provides specialist training in aquaculture operations e.g. at technical college level [N1, N2, etc.]:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

Please provide a comment on this issue:

.....
.....
.....
.....
.....

5.2.2. Is a skills and development programme currently available to employees:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

5.2.3. If yes, please indicate:

- ☐ Number of participants:
- ☐ Duration of course / Taught competencies:.....

5.2.4. Does the basic material covered include business management and entrepreneurial programmes:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

5.2.5. Have these programmes been successful

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

5.2.6. Would you be willing to create franchising/contracting out production opportunities for employees if they proved competence eg. successfully completed a skills and development programme :

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

5.2.7. Do you currently have any profit-sharing systems installed for permanent employees:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

5.3. Development of Coastal Communities

The White Paper for Sustainable Coastal Development in South Africa, in conjunction with the Marine Living Resources Act [MLRA] of 1998, seeks to ensure that the development and natural resource utilisation of South Africa's coastline progresses in a sustainable and equitable manner. In attempts to achieve this, CPP [Community Public Private] sector relationships have been proposed to provide a mechanism for the inclusion of previously marginalised and disadvantaged coastal communities within the coastal development process. For both social and economic welfare gains from coastal development to accrue to such localities, industry, government and the targeted communities themselves need to collaborate holistically with one another.

The following questions in this section seek to determine your awareness of such initiatives, your attitude towards them, and your ability to support them. All answers given are strictly non-committal. The purpose of the section is to gain an overview regarding the possible hypothetical, potential support and capacity building that could be contributed by industry.

5.3.1. In your opinion, is the surrounding communities' awareness of aquaculture:

Please circle most appropriate response

- ☐ 1. Excellent
- ☐ 2. Very good
- ☐ 3. Good
- ☐ 4. Satisfactory
- ☐ 5. Poor
- ☐ 6. Do not know

5.3.2. Would you consider participating in mariculture development partnerships targeted at empowering rural coastal and subsistence fishing communities:

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

5.3.3. For your business to become actively involved in such initiatives, what incentives would you like to be provided with:

Please circle most appropriate response responses

- ☐ 1. Access to finance at concessionary interest rates for expansion activities
- ☐ 2. Acquisition of a controlling interest in development initiatives in which you participated
- ☐ 3. An enhanced supply of product which you can market through your existing channels
- ☐ 4. Other (please specify)

5.3.4. Do you have the potential ability to provide support systems for such initiatives

Please circle most appropriate response

- ☐ 1. Yes
- ☐ 2. No

5.3.5. If "yes", in which form could such support be given:

Please circle most appropriate response/responses

- ☐ 1. Knowledge dissemination
- ☐ 2. Technological diffusion
- ☐ 3. Capacity building
- ☐ 4. Small business planning
- ☐ 5. Supply of organisms

- ☐ 6. *Equipment provision*
- ☐ 7. *Marketing/processing/investment partnerships*
- ☐ 8. *Do not know*
- ☐ 9. *Other (please specify)*

5.3.6. Have you ever been encouraged by government or other institutions to engage in such programmes:

Please circle most appropriate response

- ☐ 1. *Yes*
- ☐ 2. *No*

5.3.7. Have you been offered any incentives to engage in community-private relationships:

Please circle most appropriate response

- ☐ 1. *Yes*
- ☐ 2. *No*

5.3.8. If “Yes”, please list these incentives :

.....

.....

5.3.9. Do you believe that such development initiatives, if implemented correctly, could be :

Please circle most appropriate response

- ☐ 1. *Very successful*
- ☐ 2. *Successful*
- ☐ 3. *Have limited success*
- ☐ 4. *Fail*
- ☐ 5. *Do not know*

5.4. Personal Perceptions

5.4.1. Do you have any knowledge about proposed Community-Public-Private Sector Partnership schemes driven by the DTI (Department of Trade and Industry) :

Please circle most appropriate response

- ☐ 1. *Yes*
- ☐ 2. *No*

5.4.2. If “Yes”, what are your concerns about such relationships:

.....

.....

5.4.3. What are your fears and/or perceptions about the current and future status of the mariculture industry in South Africa:

.....

.....

5.4.4. How do you think the mariculture industry in South Africa can be successfully expanded:

.....

.....

5.4.5. What role do you think government should assume in the development of the mariculture sector:

.....

.....

5.4.6. Additional comments:

.....

.....

Appendix 2: Supplementary 2001 National Mariculture Baseline Data

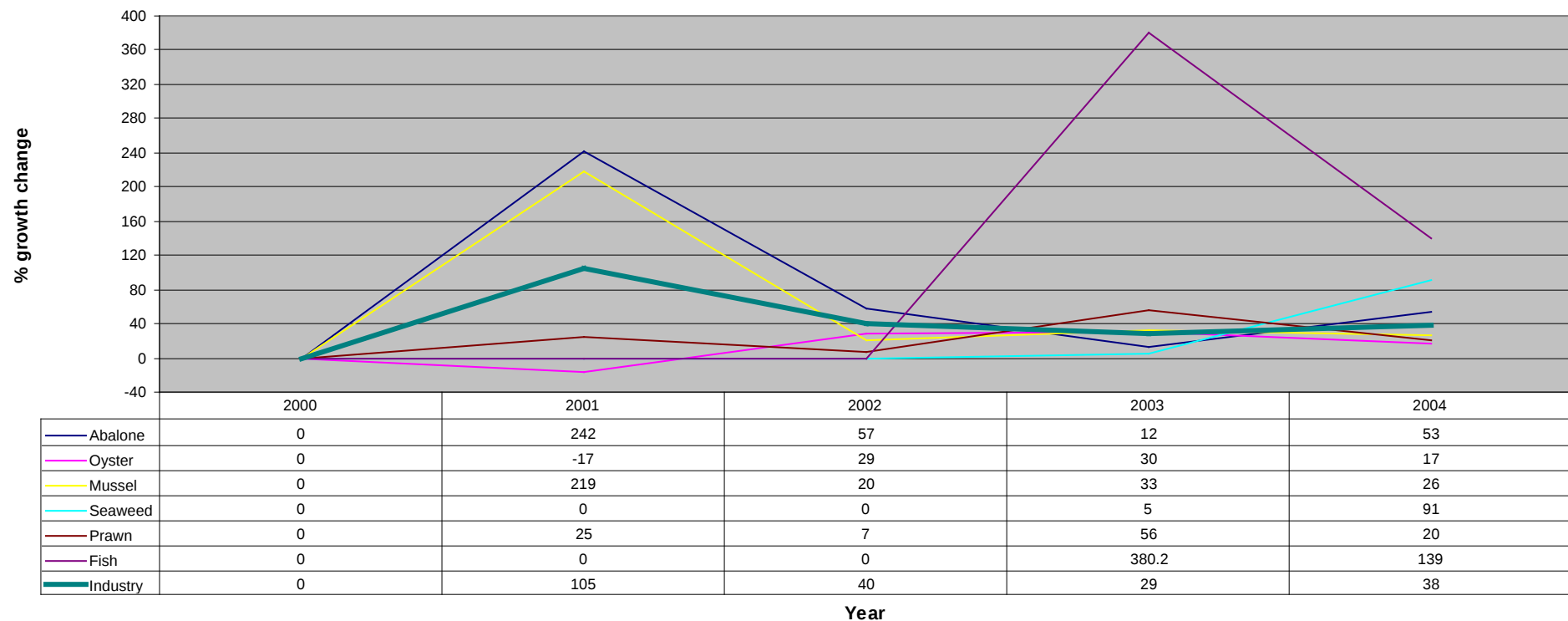


Figure A2a: Projected production output growth rates

Source: Hepburn et al. (2001:21)

Figure A2a above depicts strong projected industry growth rates occurring from present to the year 2004, bolstered by commercial emergence of new operations [most notably the fish contingent] currently classified as not operational or engaged in experimental production. However, it should be duly noted that rapid projected growth in fish and seaweed contingents necessitated their exclusion for 2002 to ensure feasible graphic presentation of the remaining data set.

Table A2a: Production expansion by operating activity

OPERATING STATUS	OPERATING CLASS	PROJECTS ESTIMATED TOTAL VALUES [in Rands]	ESTIMATED IMPLEMENTATION TIME [in years]					ESTIMATED NEW JOBS					TOTAL ESTIMATED NEW JOBS CREATED IN 5 YEARS
			1	2	3	4	5	2002	2003	2004	2005	2006	
Operational	Abalone												
	Abalone Farming & Ranching	93 500 000	2	3	0	0	0	56	125	0	0	10	191
	Abalone Farming	21 000 000	0	1	0	0	0	0	10	0	0	0	10
	Abalone Farming & Sea run Salmon	10 000 000	0	0	1	0	0	0	0	15	0	0	15
	SubTotals	124 500 000						56	135	15	0	10	216
Operational	Oyster												
	Oyster Farming [incl. packaging]	1 270 000	0	2	1	0	0	0	20	10	0	0	30
	Oyster Spat & Growouts	1 250 000	1	0	1	0	0	20	0	10	0	0	30
	SubTotals	2 520 000						20	20	20	0	0	60
Operational	Mussel												
	Mussel Processing [frozen]	7 000 000	0	2	0	0	0	0	50	0	0	0	50
	SubTotals	7 000 000						0	50	0	0	0	50
Operational	Fish												
	Fish Farming		1	0	0	0	0	10	0	0	0	0	10
	SubTotals							10	0	0	0	0	10
Operational	Prawn												
	Prawn Farming	25 000 000	0	0	1	0	0	0	0	100	0	0	100
	SubTotals	25 000 000						0	0	100	0	0	100
Not Operational	Crayfish												
	Crayfish Farming	10 000 000	0	0	0	0	1	0	0	0	0	27	27
	SubTotals	10 000 000						0	0	0	0	27	27
TOTALS		169 020 000						86	205	135	0	37	463

Source: Hepburn et al. (2001:24)

Note: Firms classified as not operational are included [where data available] as their future entrance increases industry economic value, employment and production output; for estimated new jobs, the highest fixed choice category boundary in questionnaires is used [e.g. 5-10 jobs tabulated as 10]; prawn farming data unconfirmed; seaweed data unavailable.

Table A2b: Labour profile by permit, operating activity, skills class, salary and race

PERMIT	OPERATING	LABOURER	Race	Sal.1	SKILLED LABOURER	Race	Sal.	MIDDLE SERVICE	Race	Sal.	ARTISAN	Race	Sal.	PROFESSIONAL	Race	Sal.	TOTAL	Race	Average % Labour Sourced From		
	ACTIVITY																EMPLOYMENT		Contingent	Migrant	Poor CC2
ABALONE	Farm & Ranch	247	B3	2	24	B	2	23	B	3	2	B	3	0	B			B	4.8%	14.0%	71.5%
	SubTotal	247			37		3	23			2			0			333				
		4	W4	2	4	W	3	19	W	3	5	W	3	14	W	4		W			
	SubTotal	4			4			4		4	5		4	11		5					
	Total	251			65			46			12			30		6					
	Spat	1	B	1	1	B	2	1	B	3	0	B		0	B			B	40.0%	0.0%	75.0%
	SubTotal	8		2	1			1			0			0			11				
		0	W		0	W		1	W	3	0	W		2	W	4		W			
	SubTotal	0			0			1			0			2			3				
	Total	9			1			2			0			2			14				
ABALONE	Total	260			66			48			12			32			418				
OYSTER	Farming	5	B	1	15	B	3	0	B		0	B		0	B			B	53.0%	0.1%	92.5%
	SubTotal	87		2	15			0			0			0			108				
		0	W		0	W		1	W	2	0	W		8	W	1		W			
	SubTotal	0			0			2			0			15			17				
	Total	93			15			2			0			15			125				
	Spat	7	B	2	0	B		0	B		0	B		0	B			B	80.0%	0.0%	100.0%
	SubTotal	7			0			0			0			0			7				
		0	W		0	W		0	W		0	W		0	W			W			
	SubTotal	0			0			0			0			0			0				
	Total	7			0			0			0			0			7				
OYSTER	Total	100			15			2			0			15			132				

Cont.

PERMIT	OPERATING ACTIVITY	LABOURER	Race	Sal.	SKILLED LABOURER	Race	Sal.	MIDDLE SERVICE	Race	Sal.	ARTISAN	Race	Sal.	PROFESSIONAL	Race	Sal.	TOTAL EMPLOYMENT	Race
MUSSEL	Farming	13	B	2	2	B	3	0	B		0	B		0	B			B
	SubTotal	13			2			0			0			0			15	
		0	W		0	W		1	W	5	0	W		1	W	6		W
	SubTotal	0			0			1			0			1			2	
MUSSEL	Total	13			2			1			0			1			17	
SEAWEED	Farming	8	B	2	0	B		0	B		0	B		0	B			B
	SubTotal	8			0			0			0			0			8	
		0	W		0	W		2	W	3	0	W		1	W	4		W
	SubTotal	0			0			2			0			1			3	
SEAWEED	Total	8			0			2			0			1			11	
FISH	Farming	2	B	2	0	B		0	B		0	B		0	B			B
	SubTotal	2			0			0			0			0			2	
		0	W		0	W		0	W		0	W		0	W			W
	SubTotal	0			0			0			0			0			0	
FISH	Total	2			0			0			0			0			2	
INDUSTRY		379	B		79	B		24	B		2	B		0	B		484	B
		4	W		4	W		29	W		10	W		49	W		96	W
	Total	383			83			53			12			49			580	

Source: Hepburn et al. (2001:27-28)

Key:

¹: Sal. – salary

Salary codes

1 – Less than R 1000 per month

2 – Between R 1000 & R 2000 per month

3 – Between R 2000 & R 5000 per month

²: CC – coastal communities

³: B – black

⁴: W – white

4 – Between R 5000 & R 10000 per month

5 - Between R 10000 & R 15000 per month

6 – More than R 15000 per month

Note: In infrequent instances where firms engage in more than one operating activity but only employ one individual within a specified labour class, the employee is grouped in the dominating operating activity to avoid double counting. Due to incomplete data, summary data includes estimates by Dr P. Britz.

Table A2c: Labour development by permit and operating activity

PERMIT & ACTIVITY	S1	SKILLS DEVELOPMENT PROGRAMME		COMPETENCIES TAUGHT		INCLUDE BUISINESS		CURRENT No. PARTICIPANTS	PROGRAMME SUCCESS		SUPPORT MARICULTURE		PROFIT SHARING FOR	
						MANAGEMENT					QUALIFICATION		PERMANENT EE's ²	
Abalone - Farm & Ranch	90%	Yes	67%	Business Economics	9%	Yes	57%		Yes	100%	Yes	78%	Yes	75%
		No	33%	Engineering	9%	No	43%		No	0%	No	22%	No	25%
				Diver Training	9%									
				Introductory Mariculture	9%									
				On-farm Training	36%									
				None	28%									
			100%		100%		100%	121		100%		100%		100%
Abalone - Spat	100%	Yes	50%	Business Economics	0%	Yes	0%		Yes	100%	Yes	50%	Yes	
		No	50%	Engineering	0%	No	100%		No	0%	No	50%	No	
				Diver Training	0%									
				Introductory Mariculture	0%									
				On-farm Training	50%									
				None	50%									
			100%		100%		100%	6		100%		100%		NA
Oyster - Farming	83%	Yes	20%	Business Economics	0%	Yes	20%		Yes		Yes	20%	Yes	40%
		No	80%	Engineering	0%	No	80%		No		No	80%	No	60%
				Diver Training	0%									
				Introductory Mariculture	0%									
				On-farm Training	20%									
				None	80%									
			100%		100%		100%	90		NA ³		100%		100%
Oyster - Spat	100%	Yes	100%	Business Economics	0%	Yes	0%		Yes	100%	Yes	0%	Yes	
		No	0%	Engineering	0%	No	100%		No	0%	No	100%	No	
				Diver Training	0%									
				Introductory Mariculture	0%									
				On-farm Training	100%									
				None	0%									
			100%		100%		100%	6		100%		100%		NA
Mussel - Farming	100%	Yes	100%	Business Economics	0%	Yes	100%		Yes	100%	Yes	100%	Yes	100%
		No	0%	Engineering	0%	No	0%		No	0%	No	0%	No	0%
				Diver Training	0%									
				Introductory Mariculture	0%									
				On-farm Training	100%									
				None	0%									
			100%		100%		100%	0		100%		100%		100%

Cont.

PERMIT & ACTIVITY	S	SKILLS DEVELOPMENT PROGRAMME		COMPETENCIES TAUGHT		INCLUDE BUISNESS	CURRENT No. PARTICIPANTS	PROGRAMME SUCCESS	SUPPORT MARICULTURE	PROFIT SHARING FOR		
Seaweed - Farming	100%	Yes	100%	Business Economics	0%	Yes	0%	4	Yes	100%	Yes	100%
		No	0%	Engineering	0%	No	100%		No	0%	No	0%
				Diver Training	0%							
				Introductory Mariculture	0%							
				On-farm Training	100%							
				None	0%							
			100%		100%		100%			100%		100%
Fish - Farming	100%	Yes	0%	Business Economics	0%	Yes	0%	0	Yes	0%	Yes	100%
		No	100%	Engineering	0%	No	100%		No	100%	No	0%
				Diver Training	0%							
				Introductory Mariculture	0%							
				On-farm Training	0%							
				None	100%							
			100%		100%		100%			100%		100%
Prawn - Farming	100%	Yes	0%	Business Economics	0%	Yes	0%	0	Yes	100%	Yes	100%
		No	100%	Engineering	0%	No	100%		No	0%	No	0%
				Diver Training	0%							
				Introductory Mariculture	0%							
				On-farm Training	0%							
				None	100%							
			100%		100%		100%			100%		100%

Source: Hepburn et al. (2001:32-33)

Key:

¹: s – sample

²: EE's – employees

³: CC coastal communities

Table A2d: Initial operation constraints by permit and operating activity

PERMIT		OA7											CONSTRAINTS																																							
		Initial I Source					S11	Current I Source						S	Finance					S	Location					S	Technology					S	Logistics					S	Permitting					S	Skilled Labour					S		
		1	2	3	4	5		1	2	3	4	5	O*	1	2	3	4	5		1	2	3	4	5		1	2	3	4	5		1	2	3	4	5		1	2	3	4	5										
Ab1	F&R8						90%							90%						90%							80%						60%						50%						90%							50%
		55%	0%	0%	11%	88%		44%	0%	0%	11%	88%			0%	0%	44%	44%	12%		0%	12%	25%	38%	25%		0%	0%	50%	50%	0%		0%	20%	60%	20%	0%		0%	11%	33%	45%	11%		0%	0%	80%	20%	0%			
	S9						50%							100%						100%							100%						100%						100%							100%					100%	
		0%	0%	0%	0%	100%		0	0	0	50%	100%			0%	50%	50%	0%	0%		0%	50%	0%	50%	0%		0%	100%	0%	0%	0%		0%	50%	50%	0%	0%		0%	50%	0%	0%	50%		0%	100%	0%	0%	0%			
Oy2	F10						100%							83%						100%							83%						83%						83%						83%					83%		
		17%	0%	0%	0%	83%		0%	0%	0%	0%	100%			0%	33%	0%	50%	17%		0%	20%	40%	20%	20%		20%	20%	60%	0%	0%		0%	40%	40%	20%	0%		0%	0%	20%	20%	60%		20%	20%	60%	0%	0%			
	S						100%							100%						100%							100%						100%						100%						100%					100%		
		0%	0%	0%	0%	100%		0%	0%	0%	0%	100%			0%	0%	0%	0%	100%		0%	0%	0%	100%	0%		0%	100%	0%	0%	0%		0%	100%	0%	0%	0%		0%	0%	0%	100%		0%	100%	0%	0%	0%				
Mu3	F						100%							100%						100%							100%						100%						100%						100%					100%		
		100%	0%	0%	0%	0%		0%	0%	0%	0%	100%			0%	100%	0%	0%	0%		0%	100%	0%	0%	0%		0%	0%	100%	0%	0%		0%	100%	0%	0%	0%		0%	0%	0%	100%		0%	100%	0%	0%	0%				
Se4	F						100%							100%						100%							100%						50%						50%						100%					50%		
		100%	0%	0%	0%	50%		34%	0%	0%	0%	33%	33%		50%	0%	0%	0%	50%		0%	50%	0%	0%	50%		0%	0%	0%	0%	100%		0%	0%	100%	0%	0%		0%	0%	0%	100%		0%	0%	0%	0%	100%				
Fi5	F						100%							100%						0%							0%						100%						0%						0%					0%		
		0%	0%	0%	0%	100%		0%	0%	0%	0%	100%															0%	0%	100%	0%	0%																					
Pr6	F						100%							0%						100%							100%						100%						100%						0%					100%		
		0%	0%	0%	0%	100%			0%	0%	0%	100%	0%		0%	0%	0%	100%	0%		0%	0%	100%	0%	0%		0%	0%	100%	0%	0%		0%	0%	100%	0%	0%							0%	0%	100%	0%	0%				

Source: Hepburn et al. (2001:41)

Key:

1: Ab – abalone

2: Oy – oyster

3: Mu – mussel

4: Se – seaweed

5: Fi – fish

6: Pr – prawn

7: OA – operating activity

8: F&R – farming & ranching

9: S – spat

10: F – farming

11: s – sample

Initial & Current Investment Sources:

1 – domestic investment/loans 2 – foreign direct investment 3 – foreign aid 4 – government assistance 5 – private capital

Finance, Location, Technology, Logistics, Permitting and Skilled Labour Difficulty Levels:

1 – very easy 2 – easy 3 – difficult 4 – very difficult 5 – nearly impossible

Note: Percentages for Initial & Current Investment Sources do not aggregate to 100% due to multiple funding sources used by certain firms

Table A2e: Potential willingness to engage in CPP initiatives

PERMIT & ACTIVITY	S1	KNOWLEDGE OF CPP2		ENCOURAGED BY G3		WILLINGNESS TO PARTICIPATE		INCENTIVES REQUIRED TO BECOME ACTIVELY INVOLVED	
Abalone - Farm & Ranching	80%	Yes	38%	Yes	38%	Yes	88%	Concessionary IR4 for expansion	38%
		No	62%	No	62%	No	22%	Controlling interest in initiative	63%
								Product marketed via own channels	13%
								Greater resource access	13%
								Business sale & mentorship	0%
Abalone - Spat	100%	Yes	0%	Yes	0%	Yes	100%	Concessionary IR for expansion	50%
		No	100%	No	100%	No	0%	Controlling interest in initiative	100%
								Product marketed via own channels	0%
								Greater resource access	0%
								Business sale & mentorship	0%
Oyster - Farming	83%	Yes	0%	Yes	20%	Yes	100%	Concessionary IR for expansion	40%
		No	100%	No	80%	No	0%	Controlling interest in initiative	0%
								Product marketed via own channels	80%
								Greater resource access	0%
								Business sale & mentorship	20%
Oyster - Spat	100%	Yes	0%	Yes	0%	Yes	100%	Concessionary IR for expansion	0%
		No	100%	No	100%	No	0%	Controlling interest in initiative	100%
								Product marketed via own channels	0%
								Greater resource access	0%
								Business sale & mentorship	0%
Mussel - Farming	100%	Yes	0%	Yes	100%	Yes	100%	Concessionary IR for expansion	100%
		No	100%	No	0%	No	0%	Controlling interest in initiative	0%
								Product marketed via own channels	0%
								Greater resource access	0%
								Business sale & mentorship	0%
Seaweed - Farming	100%	Yes	0%	Yes	0%	Yes	100%	Concessionary IR for expansion	100%
		No	100%	No	100%	No	0%	Controlling interest in initiative	0%
								Product marketed via own channels	0%
								Greater resource access	0%
								Business sale & mentorship	0%
Fish - Farming	100%	Yes	0%	Yes	0%	Yes	100%	Concessionary IR for expansion	100%
		No	100%	No	100%	No	0%	Controlling interest in initiative	100%
								Product marketed via own channels	0%
								Greater resource access	0%
								Business sale & mentorship	0%
Prawn - Farming	100%	Yes	0%	Yes	100%	Yes	100%	Concessionary IR for expansion	0%
		No	100%	No	0%	No	0%	Controlling interest in initiative	100%
								Product marketed via own channels	0%
								Greater resource access	0%
								Business sale & mentorship	0%

Source: adapted Hepburn et al. (2001:35-36)

Key:

1: s – sample

2: CPP – community public private

3: G - government

4: IR – interest rate

Appendix 3: Indonesia's Rural Credit Reform Programme

Simpanan Pedesaan or General Rural Savings [SIMPEDES]⁵¹ and Kredit Umum Pedesaan or General Rural Credit [KUPEDES] was the official form of rural deposit-sourced lending introduced in 1984, provided through village units of the state-owned commercial bank, Bank Rakyat Indonesia [BRI]. Later, state-sourced finance was supplemented by World Bank aid to provide additional resources for lending.

The KUPEDES programme is comprised of village units and monitored by BRI branches. Village units consist of 4 members: a unit general manager responsible for staff supervision, a field agent investigating loan applications and collecting repayments, a cashier handling cash transactions and a book-keeper preparing reports sent to local BRI branches. Village units are permitted to hold limited finances to cover transaction costs and include remuneration incentive schemes encouraging unit members to attract additional clients. BRI branches supervise 12 village units via regular weekly visits. The branches hold village unit finances, interest earning deposits and authorise loan approvals requiring land ownership as collateral.

Success of the programme has seen nationwide spread of SIMPEDES in 1986, two years after being implemented as pilot village unit projects, where it has become the savings instrument of choice among village unit customers. Snodgrass & Patten (1991:355) attribute the allowance of unlimited withdrawals by savers as an integral component of programme success⁵². Table A3a below demonstrates the profitability of the village unit system realised in 1986.

Table A3a: Profit/loss of SIMPEDES village unit system

Year	Profit/loss [Rp billion]
1984	-25.1
1985	-0.9
1986	+9.8
1987	+22.5
1988	+30.7

Source: Snodgrass & Patten (1991:357)

Although the programme remains stable, increases in long-term loss ratios “unfortunately reinforce the wide-spread perception [among bank management] that small loans are inherently risky” (Snodgrass & Patten, 1991:358). However, Snodgrass & Patten (1991:358) attribute the trend to “slow writing off of bad debts ... and concentrated arrears in a relatively small number of branches and village units, where heightened management attention is needed”.

⁵¹ SIMPEDES pays zero interest on accounts with monthly balances less than Rp 25 000; 9% on balances from Rp 25 000 to 200 000; and 12% on balances above Rp 200 000 (Snodgrass & Patten, 1991:354-355).

⁵² Although “few customers make two withdrawals in a single month” (Snodgrass & Patten, 1991:355).

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