STRATEGIC NATIONAL INFORMATION MANAGEMENT AND TECHNOLOGY TRANSFER THE CASE OF KENYA

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D E C L A R A T I O N

A B S T R A C T

This is a study of information management in technology transfer, industrialisation and national economic development. It is based on a case study of Kenya. It argues for national information management as an aid to informed strategic decision making in technology identification, selection and negotiation. It proposes that effective technology transfer to developing countries depends on the information management capability of the national institutions responsible for managing the process because institutions are information processing organs. National institutions can support the technology transfer process by making the internal and external environment transparent for the economic agents in the country. They can create the environment in which learning takes place by supporting decision making based on information and using the best expertise. To support the process, national institutions require to build institutional memory and proceduralise the transfer of lessons between projects. This is the way to advance indigenous technological capability. Institutionalising informed decision making is necessary if a developing country like Kenya is to benefit from developments accompanying the new information technologies. Institutional re-organisation should, therefore, be at the centre of national information and informatics policies. Two project case studies from Kenya are used to demonstrate the argument.

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D E D I C A T I O N

I would like to dedicate this work to the memory of my son James Ouma Onyango who died in 1987.

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This thesis is about the role of information management in technology transfer, industrialisation and national development. It demonstrates the importance of information and intelligence in planning, negotiations, joint-venturing and decision making. The thesis demonstrates the criticality of effective intelligence management by analysing two technology focused development programmes in Kenya.

The thesis argues that poor information management by organisations in LDCs undermines efficient operations and competitiveness. It weakens planning because of low appreciation of the local and external terrain. It makes programme reviews difficult because targets are poorly specified and documented. Organisations fail to learn from experience because this is not documented and proceduralised for subsequent decision making. Negotiating capability is weakened by poor information on internal capabilities, lack of intelligence on negotiating partners, competitors and other players, their capabilities, strategies and mindsets, and on alternatives and substitutes which are available and lack of contingency preparations.

This thesis shows that in Kenya, poor national information management has contributed to incorrect reading of internal and external events and trends. This has resulted in poor indigenous technological capability assessment and in the acquisition of unsuitably pre-packaged technologies on unfavourable terms. This

has undermined effective technology transfer and retarded industrialisation and national development.

The effect and direction the information economy will take in less developed countries (LDCs) is difficult to gauge. Some studies have measured the information sector in LDCs along the lines adopted for advanced economies by Machlup (1), Lamberton (2), Porat (3) and others. These have shown a similar growth of the sector. But Katz (4) has attributed this expansion of white collar workers in the public sector to an expanding and unproductive bureaucracy and not to economic changes.

Other studies have explored whether the information economy heralds an opportunity for LDCs to "leap-frog" the industrial phase of development. But Reddi (5), Cruise O'Brien (5), Dedijer and Jequier (7) identify inadequate information systems in the decision-making processes in LDCs that undermine this possibility. International efforts to rectify this information imbalance underpin the call for a New Information and Communication Order (NWICO).

Others have questioned whether LDCs appreciate the strategic significance of information and whether they have the competence to manage it effectively. This was the basis of Salinas' (8) study of Latin American debt crisis and Menou's (9) cultural ascriptions to differences in information management.

This thesis is a study of Kenyan institutions responsible for

technology acquisition and management. It builds on the technology-related research of Matthews (10), Bennel (11), Langdon (12), Coughlin and Ikiara (13), and Clark and Juma (14). It is, therefore, an informational diagnosis of terrain problems identified by such studies.

The transparency/opacity model used in this study is derived from Henley's (15) finding that the level of opacity prevailing in Kenya's economic terrain undermines cost-effectiveness and competitiveness of economic agents located there. The high operational costs of terrain opacity is also the theme of de Soto's (16) study of the Peruvian economy.

This study argues that the essence of information management is reducing uncertainty and enhancing terrain transparency. It defines the informational role of national environment enabling institutions in LDCs as advancing terrain transparency to help economic agents reduce operational costs, raise efficiency and be competitive.

Information and institutional capability management have still to enter mainstream development thinking. But, case studies of Pacific rim economic successes like those by Davies (17), Smith (18), Enos and Park (19) credit environment enabling institutions with intelligently navigating technology selection, acquisition, transfer and adoption and managing industrialisation and development policies.

Environment enabling institutions are located in the information sector of an economy. Good national information resources management will enable timely access to national and international data, information, knowledge and expertise bases. This would advance the technology acquisition and transfer opportunities of economic agents. This study is, therefore, also an evaluation of capability building among institutions that manage technology transfer.

Case study method is used. Looked at are procedures for taking stock of and identifying gaps in national capabilities, negotiating for buying-in capability, monitoring objectives, and scheduling of programmes. Project reviews and measures to integrate experience and learning in subsequent practices is also looked at.

Two projects were selected in order to evaluate transfer of experience and learning in decision-making procedures. Their size, complication and novelty tested the capability of national institutions. As public sector programmes they tested the ability of government institutions to identify and requisition required expertise located in the country.

Interest in power alcohol started in 1975 culminating in the introduction of gasohol in Nairobi in 1983. The national car project was proposed in 1984 and the first phase concluded in 1990 with the unveiling of the Nyayo Pioneer prototypes. This study takes on board secrecy under the Officials Secrets Act and looks at

how this affected the implementation of the projects.

The research was conducted through open-ended interviews with those in institutions and organisations that had participated (or showed interest) in the projects, consultation of related primary and secondary documents, visits to libraries, documentation, records, data centres and institutions involved with the cases.

The findings point to a high degree of terrain opacity despite the existence of institutions intended to address it. Many of these do not co-operate or share information and expertise. A number no longer fulfil initial objectives. In the circumstances, the Official Secrets Act aids to conceal inadequacies in capability and undermines accountability and efficiency. The projects studied suffer from low specificity in targeting of goals and time frames which weakens evaluation and reviews.

Recognition by individuals of the need for improved information management to enhance terrain transparency, technology transfer, accountability and efficiency is not reflected in institutional operations. Procedural familiarity takes precedence in decision-making and is supported and protected by insular procedures, the Official Secrets Act and import substitution industrialisation strategy. This supports some of Menou and Salinas' observations.

This study demonstrates that for effective technology transfer and industrialisation Kenya will need to improve the capability of its

institutions to enhance internal and external terrain transparency. This information management activity is considered central to advancing the capability of environment enabling institutions involved with technology transfer, industrialisation and general development. Investing in advanced information processing capability, as proposed under the **Information and Informatics Policy** in Kenya's Development Plan 1988-1993 (20), without institutional re-orientation is unlikely to give adequate returns. The contribution of the information sector to Kenya's technology transfer and development efforts is seen as centring on enhancing terrain transparency.

1.0.0 RECONCEPTUALIZING DEVELOPMENT

1.1.0 Introduction

The development process remains a "mystery" to development specialists despite a growing body of literature over the decades (1:p.15). The 1980s was a "lost development decade" for much of the Third World. It was characterised by falling per capita incomes, foreign exchange crises, worsening debts, rising malnutrition, deteriorating health and the disintegration of infrastructures (2:p.203-4). Gaps in the understanding of the development process are confirmed by the uncertainties surrounding the 1990s.

This knowledge deficiency is partly due to the narrow disciplinary specialisation of social sciences which has made it difficult to grasp the full nature of the wider development process. Although a focus of various social science disciplines, the sub-discipline of development economics has given economics a high profile in the generation of intellectual ideas in this area.

The frustrations of underdevelopment are exacerbated by tragedies and disasters caused by natural and man-induced calamities that drain human and infrastructural resource investments in less developed countries (LDCs).

This chapter will argue for an information dimension to development studies that takes into account the electronic based information economy and recent experiences. It will suggest a flexible, multi-disciplinary, knowledge and information-based development paradigm. The new framework conceives development as constituting behaviourial and institutional changes in a country. The process of change creates uncertainty. This can be destabalising and unpredictable. Improved knowledge and awareness of local and international environment based on good national information management helps cope with managing change and uncertainties. A proactive information and knowledge seeking posture makes it possible to conceive policies that take stock of national capabilities and are able to advance national learning. Alertness to internal and external changes among a country's institutions makes it possible to take advantage of opportunities, if and when they occur, in an international arena of countries defined by perpetual competition and change.

1.1.1 The Conceptualisation Problem

Development is often perceived exclusively in economic terms. But it also has implications for social well-being, political and regulatory structures and policies, and the infrastructures, organisations and institutions set up to implement national policies. These are the environmental and economic enabling institutions. They are intended to deduce and define the path of change and then to encourage and cajole economic agents and the

wider society to pursue the path. These institutions amount to a nation's collective thinking, memory and decision-making facility or intelligence. They depend on resources generated from economic performance. Because economic, social, political and other intangible aspects of development are so closely interrelated, they have proved difficult to separate and study under existing functional structures of disciplines. Only a holistic, multidisciplinary approach can address the role, activities and organisation of man, society, the natural and physical environment (3:p.28), and change over time (4:p.82).

It is realised that economic and social development is too complex a phenomenon to be competently and comprehensively addressed by any one "functional discipline" or through the models of specialised sub-disciplines like development economics (5:p.10). However, a holistic framework has yet to be established. Contributing to delay is the traditional segmentation of the disciplines in the area. The result of this gap is that development models have been drawn up and implemented in LDCs on the basis of, and intended to legitimise, ideology and faith. Many of these models are imported as "blue-print" solutions with little consideration for the realities of where they are being applied (3:p.26).

As a study of the problems of non-industrialised countries, development studies is a product of the 1950s (1:p.9). Shifts in focus, and the accompanying strategies, have reflected changing

perceptions caused by identified weaknesses in prevailing thinking. Thus, in the 1950s, with most LDCs still colonies linked economically, culturally and politically to an industrial country, prevailing theories legitimised the status quo. Export of primary products and surplus, and import of manufactures, human expertise, investments, technology, institutions, ideas, values and culture from one dominating source was considered inevitable to the process of development (1:p.10). The 1960s was a period of political independence and hope. This was reflected in the overly optimistic development models of the time. The 1970s was a period of expansive borrowing and the 1980s characterised by debts (5:p.17). The changing scenario has proved difficult to study from static disciplinary boundaries.

1.1.2 The Conceptual Shifts

In the 1950s and 1960s, the development process was viewed as a matter of time, "given appropriate measures" (6:p.27). The gap between the LDCs and other countries was considered a product of the latter's earlier start. The concept of "stages of development" argued that "once a country reached the critical level of investment, take-off would automatically occur" (7). However, Latin America after two centuries of political sovereignty, Africa's continuing deterioration and the unheralded emergence of the Pacific region economies in less than a generation have weakened the time premise.

The African and Latin American debt scenario in the 1980s has led to a loss of confidence in governments (6:p.29). In sub-Saharan Africa, this is evident in the retreat to subsistence agriculture by peasants and the expanding black markets. These sectors are out of control of such organs of state as marketing boards and banking institutions. But this loss of credibility in governments as "composers and conductors of economic change" (8:p.179) also reflects a failure in the intellectual grasp of the process. Many LDC governments have faithfully administered blue-print development solutions advanced by prevailing schools of thought with little to show.

While industrialisation strategies remain trapped by debates on whether second-hand/intermediate equipment is the appropriate technology for LDCs, the emergence of multinational corporations (MNCs), their dominance of many LDC economies and their control of the pervasive electronics and telecommunications technologies has shifted the parameters for such a theory. Information, knowledge and other intangible inputs have taken centre stage. This has occurred at a time when many LDCs are only getting to grips with the management of physical infrastructures, commodity price mechanisms, and the collective arguments for new economic order. Natural endowments like climate and minerals are no longer adequate to fund and sustain economic growth in a future threatened by science-created substitutes, changing tastes and competition between nations.

Conventional wisdom and tested practices can no longer cope with the pace of change (6:p.29). Continuous learning is now a priority for development. However, institutions like marketing boards and central banks were not structured for learning and change and have become obstacles.

Economic models have become irrelevant (4:p.80). But a new consensus on how to manage development is yet to be found. The perplexity is exacerbated by open disagreements like that between international economic institutions like the World Bank and IMF (International Monetary Fund) on the one hand, and the UN-based Economic Commission for Africa (UN-ECA) on the other over the modus operandi for re-structuring sub-Saharan African (9). Concepts of development therefore need to be re-diagnosed.

1.1.3 Conceptual Re-diagnosis

Onimode (10:p.37) considers the conflict between development theories and reality an "intellectual crisis". He states that theorists have doctored reality to make it correspond to their assumptions. This has led to flawed conclusions. He blames (10:p.26-7) also a trend in neoclassical economics, copied by other social sciences, towards narrow, mathematical and abstract models for "trivialising studies of development". Such mathematical models have made comparisons with reality difficult and shrouded the process in mystery. They have led to the implementation of

blue-print programmes that are opaque to implementers as well as those whose lives are affected by them. Poor constructions of social reality have led to "false problems begetting false solutions" (10:p.27). With the models wrapped in ideological packages, epistemological barriers to rational, open and objective testing and review have been prevented. As a result, accountability has been lost. This has permitted demagoguery and dogmatism to pass for expertise.

Lewis (4:p.82) pointed out that income-projection models of development economics failed because actual economic success was determined by intangibles like "political security, quality of infrastructures, reliability of skilled workers and contractors, and opening of new market opportunities". But such intangibles do not fit into models. They are thus hidden under unrealistic assumptions which "foredoom" the subsequent programmes.

But models that "blind reality" feature in other development focused social sciences. For example, the "ideal type" index adopted by development sociology ascribed underdevelopment to national characteristics like "role diffusion, ascriptive status, particularism and collectivism" (10:p.34). Therefore, successful development depended on adoption of Western society indices of "role specificity, achieved status, universalism and individualism" (10:p.34). Exceptions like the extended family systems of South Korea and Taiwan, for instance, and the downward spiral of

individualist Latin America were not explained.

In political science, political development has been projected as a "technical input-output process intended to maximize nebulous variables like structural differentiation, cultural secularisation, formal equality of the market place (not social equality), and Weberian bureaucracy" (10:p.34). Development psychology suggests inertia, lack of foresight, and low need-achievement motivation as underlying the underdevelopment trap.

Such models obstruct, rather than aid understanding of the development process. They "mystify and distort reality" (10:p.34). Implementors of blue-print plans created from the models and participants in the development programmes fail to appreciate what is going on. This prevents them undergoing perceptual and conceptual change central to the process of learning. They do not benefit from participation because they are unable to independently apply these experiences later. Development means change in the mental and institutional arrangements of a society based on experience, learning and the absorption of new and improved ways of economic activity. Implementing opaque blue-prints that cannot be reviewed on location prevents such change and therefore obstructs the development process. To reconceptualise development means advancing the understanding of the process in society. It is a shift away from static models.

1.1.4 The Framework for Reconceptualisation

The crisis in development concepts is caused by a mismatch between social and economic structures and institutions and changing realities. It reflects the failure of physical, mental and conceptual institutions, structures and regulations to effectively adapt to constant changes in the immediate and international environment.

In order to adapt, the institutions and structures need to work towards enhancing the general transparency of the environment. This would improve national appreciation of reality. This then makes it possible to advantageously utilise socio-cultural differences in the competitive economic arena (11:p.373).

To achieve such national synergy depends on the organisations, regulations, policies, infrastructures and institutions responsible for diagnosing, conceiving, defining, identifying, synthesising, navigating and reviewing the development path. These organs are the national environment enabling institutions.

These institutions need to draw up transparent development models that are openly testable and, if in doubt, discardable, and which emphasise widened participation and learning. Sacrosanct packages and models and persistence in error are costly. Such a performance, however, requires certain capabilities to be resident in, or accessible to, the environment enabling institutions. Davidson's (12:p.6) summation that the African development crisis

is a "crisis of institutions" testifies to the absence of, inaccessibility to, or failure to seek, such capabilities.

A central role of institutions as environment enablers is to reduce uncertainty and unpredictability, and therefore opacity, in the economic landscape, or terrain. Transparency permits informed and synergistic interaction with the environment by economic agents and the wider society.

Organisations and institutions are organs for information acquisition, processing, storage and dissemination. Their main role is to cause an unimpeded, effective and beneficial information flows within and with the outside world. In poorly infrastructured, multi-ethnic, unintegrated, geographically widespread, disparate and inaccessible LDCs, effective information flows is vital.

Information flows advance closer national integration and aid government administration. Because increased information flow follows movement of goods and people it also advances commerce. Information flows aid in bringing about the necessary conceptual and organisational changes that are an integral part of the development process. Improved information flows also help in creating a better informed community able to adopt to, and anticipate, changes.

National institutions need to create transparency because it induces confidence by reducing uncertainty. This inspires participatory and informed decision-making which improves economic activity. But intangibles like institutional capability building towards meeting such needs are difficult to measure. However, capability building needs to be incorporated in development concepts.

Advances in information and communications technologies have tied the destinies of countries closer, made them more vulnerable to international events, and intensified competition between them. With the addition of the growing power of MNCs in this equation, the position of the nation-state unit in development needs review (1:p.15). However, participation in the international arena remains dependent on the capacity of a nation's institutions to select and navigate a suitable path (1:p.16). Negotiating a consensus between competing or conflicting national goals and international participation requires information and knowledge management capability in the relevant national institutions. Such capability has yet to receive adequate attention in mainstream development thinking.

Development as change and, therefore, subject to unanticipated dislocations, disruptions and general disequilibria is also still in the periphery of mainstream development thinking. Most development models assume stability and statism (or absence of

change) over unrealistic time spans. This results in inadequate attention being paid to contingencies in programme implementations. There is therefore a need to improve the means to anticipate and cope with disruptions that are an attendant part of change and development. The philosophy of no "creation without some degree of destruction" (11:p.370) or Sunkel's (1:p.17) and Schumpeter's (13) "creative -destruction" is not new although it has yet to fit into mainstream thinking.

In a transparent environment, the capacity to anticipate among economic agents is improved because crises signals can be identified early. This inspires confidence by minimizing uncertainty and unpredictability. This is vital to the management of change and change is integral to development. It is, therefore, institutional capability building, which is founded on information management, and how this determines the management of change that are to be the new ingredients in the reconceptualised development framework.

1.1.5 Conceptualizing the Process

Economic growth and development are not the same thing. Trends in LDCs have shown that it is possible for economic growth to take place without development - in the sense of changes to social, institutional, political and regulatory changes. Growth indicators can be raised by sudden rises in the value of export while institutions remain at an unchanged levels of operation.

Kuznets (14:p.56) however defined economic growth as a country's "long-term rise in its capacity to supply increasingly diverse economic goods to its population". The growing capacity should be based on advancing technology and institutional and ideological demands. This definition excludes countries possessing a resource exploitable by more developed countries and which only appropriates the large margins in economic rent. He focuses on growth founded on efficient and wide employment of technology, institutional and ideological adjustments and change and on effective use of innovations generated by the global stock of advancing human knowledge (14:p.56). Kuznet's view of economic growth is broader than what has been pursued in LDCs. It is in accord with our perception of what constitutes the development process. An effective use of global knowledge stock requires a national orientation to strive and learn through which experiences, information and knowledge attained, acquired or purchased can be diffused and adapted by and to local institutions and capabilities (15:p.xii). It is not sufficient if the acquired new and expensive information and knowledge is used circumspectively. In any case this would reduce the impact of change and, therefore, the rate of development.

The foregoing proposals do not consider as industrialisation or development increases in production plants or wage earners in technological enclaves whose operations have little contact with

mainstream economic and social activities of a country. Similarly excluded are LDCs which become rich through fortuitous discovery of a resource, like petroleum, whose production costs are small relative to value. The subsequent large economic rents boost economic growth indicators despite limited local participation in the creation and consumption of the wealth.

Windfalls also follow international commodity price booms. It was the case with the copper prices in the 1970s (on the Zambian economy) and the coffee boom in mid-1970's (on Kenyan and Tanzanian economies) following freak weather destruction of Brazilian coffee harvest. Rimmer (8:p.175) has argued that windfalls can undermine development through "anaesthetizing national thinking" and financing the maintenance of old institutions, regulations and organisations that obstruct social learning and change.

Khalek (16:p.3) concept of development is a "process of comprehensive social change that releases latent energies for creative behaviour". This implies causing optimal interaction of individual and societal capabilities. But such a synergistic arrangement requires consideration for historical, cultural and material conditions. These vary between countries. Khalek emphasises the importance of the experience of particular societies as input in their development process. This makes the process historically and socially specific.

Universal models are seen as ahistorical and asocial. Hyden (17:p.65) pin-points such models as the source of widely institutionalised "blueprint planning in Africa". Here, the wishes, knowledge, experiences and involvement of local people likely to be affected by the "imported blue-prints are disregarded" in preference for the assumptions about reality made in the pre-packaged solutions. The result is that neither the "solutions", the authors nor the implementors can be subjected to transparent assessment or held accountable for subsequent failures. This has nurtured unaccountability in African bureaucracies and alienated them from the aspirations of the societies they are meant to serve.

Hyden (17) has concluded that Africa's institutions are not bureaucratised and depersonalised enough. This is because the institutions do not depend enough on impersonal rules, procedures and information in decision-making. The result is highly personalised systems of operations. Instincts and personal contacts define the quality of decisions made by institutions, and by reference, the country. When individuals move much of their skills is lost to organisations. This lack of institutionalised learning and decision-making processes affects projects and programmes implemented.

There is, therefore, a search for new conceptualisations that focus on creating a self sustaining development process based on

cumulative learning in the institutions of an economy. The institutions do this by searching for, identifying and optimally using the advancing stock of human knowledge and technological innovations. This orientation needs to be invested in those institutions responsible for conceiving, planning, implementing and managing change. Because institutions are essentially information management organs, their ability to manage information has implications for the pace of national development.

This study will show that the failure to consider the information element in the development equation contributes to failures in development programmes.

1.2.0 The Cost of Misconceptions

Much of the intellectual input in development studies originates from international agencies like the UN and the World Bank and academics from the developed world. However, recent instability in the area originates from LDC realities. The state of underdevelopment has been made acute by heightened political awareness kindled during the fight for self-determination. This is worsened by increasing international transparency arising from improving communication and information flows exposing privileged life in rich countries (18:p.87).

Growth and modernisation paradigms underpinned prescriptions that emphasised export of commodities to finance investment in

production and export of manufactured consumption goods (19:p.37). The prescriptions did not give adequate attention to mechanisms for widening participation. Exports of manufactured goods remains elusive.

The result has been dual and unintegrated economies in which the large rural-based subsistence or traditional sectors remain unlinked to the smaller urban-based or export production focused modern sectors (1:p.10). The modern/export sector consumes most imports including imported technological improvements and packages for economic re-organisation (19:p.37). The traditional sector remains dependent on age-old and relatively inefficient production technologies, outmoded economic organisations and little resource infusion even in times of economic growth. Programmes for change consider this sector and its populace obstacles to progress.

The industrialisation programmes emphasised import-substitution industrialisation (ISI) strategy. But the industries depend on automated or semi-automated imported machinery in spite of the excessively under-utilised local labour. This continues the de-integration process with much unemployment and underemployment concealed in the subsistence and, its offshoot, informal sectors. The raw material needs of the imported machines are such that they cannot be supplied locally. The result is little interdependence or integration between industrial, primary and skills or manpower production sectors of these economies. No substitution takes

place, only replication (19:p.37). Innate indigenous initiative, innovative and entrepreneurial instincts and capacities are sidelined and stultified.

The enclave industries are recorded as growth and credited to the country as development. But ISI actually converts LDCs into indefinite locations for assembly of foreign consumer goods, some machines and a little technical know-how, in return for some employment and a few static skills (19:p.37). Wilford and Lochhead (20:p.622) find the ISI premise that a country could, by distorting its internal price structure, achieve independence from commodity exports through subsidies and taxation, flawed. It has led to internal mis-allocation of resources. Because the programmes have been implemented as opaque blue-prints, conflicting objectives have been pursued and main goals undermined. The strategies did not take stock of, and therefore did not address the enhancement, of a country's capabilities or base comparative advantages on special cultural traits or skills. No attempts were made to unpackage the blue-prints and to relate them to local realities. Pursued as total packages, they have served to undermine confidence in all that is indigenous and subverted long-term national aspirations in LDCs.

Failure to define and match blue-print goals to long-term national aspirations has prevented negotiations for internal compromises and consensus. This is important in removal of potential conflicts

between long-term internationalist national objectives and short-term local needs. Negotiating an organic and participative compromise is important for the pursuit of change and development. The Japanese economic miracle and the Pacific rim follow-up are characterised by an organic compromise between Eastern cultural nuances and Western competitive technology and work habits.

Sub-optimal compromises, based on ill-defined goals, create conflicts that undermine the wider pursuit of change. In Africa particularly, lack of consensus has led to pursuit of goals unclear even to national experts. As result the performance of expert institutions responsible for implementing the goals cannot be evaluated. The accountability of these institutions cannot thus be guaranteed. Such situations permit pursuit of short-term personal gains that have been attributed variously to excessive bureaucracy, a lack of bureaucracy, cultural traits and corruption.

Ventura (21:p.172) points to a lot effort, guile, entrepreneurial talent and time expended in pursuit of corrupt practices that could be harnessed for positive social ends. He also points to information being used to subvert, rather than enhance, local control and management systems. The lack of accountability in national institutions nurtures this. The development packages predicated on Western belief systems, values, social modes, and economic and political organisation (19:p.38) have created

alienated institutions. Their unaccountability nurtures corruption and undermines pursuit of excellence (21:p.171). The lack of negotiated compromise between economic sectors permits pursuit of other agendas and this encourages corruption.

The result is two unrelated cultures that feed conflict. One culture looks externally for nurturing and identification. This also prevents local evaluation of its performance. The other is stymied, stultified and sidelined, but is too rooted in history to stamp out. The uncompromised cultures proffer an a la carte menu of values and standards that undermines the evolution of a common transparent system of performance standards or a national conscience. Without such transparency the "new rules of the economic growth game" (19:p.38) are liberally interpreted. It is this personalised interpretation of procedures that Hyden (17) attributes to a lack of bureaucratization. It is Africa's crisis of institutions.

ISI supports the situation. Potential local industrial inputs are dismissed because the criteria for excellence among national modernising institutions are externally defined. As both Hyden (17) and Ventura (21) agree, local control of the definition of excellence and good practice is central to management of change. In sub-Saharan Africa it has been surrendered. The result is described as prevalent "mediocrity and fawning mimicry" (21:p.171) in institutions responsible for creating new ideas and change.

In Kenya, ISI strategy led to local cloning of goods previously imported (22:p.80). But the technology required for cloning and much of the input must be identical to that employed abroad. High precision, machine-intensive production techniques have thus been adopted that have no use for Kenya's abundant craft/artisan skills. The technology and programmes do not marry local capability to the imported mass-production precision machinery industry. The modern sector does not permit credit to be transferred from indigenous craftsmanship. Recent studies show that ISI cannot productively employ manpower skills from Kenya's modern training systems either. Kenya's ISI strategy has not addressed unemployment, balance of payments constraints (22:p.80), existing skills or the process of learning. The industrial sector emphasises consumer goods at the expense of capital goods and has failed to generate a sustainable process of economic growth (23:p.49).

ISI's foreign legitimization processes stops local assessment and does not allow participating corporations and individuals to be held accountable for the undertakings they make. It gives a country rows of factories run on technologies beyond the comprehension of its people. Such "black-box" technologies are chosen for the final products and little attention is given to the evolution of national skills and learning. The responsible national institutions are not encouraged to unpackage the blue-print programmes and "black-box" technologies that clone previous

imports. Institutional curiosity required for learning and the pursuit of excellence is stultified.

Blue-print plans and "black-box" technology solutions are a "mystery" that mesmerises a people and their enabling institutions. Institutionalised decision-making and management processes have thus lost objectivity. Informed decision-making, central in accountable organisations, becomes unnecessary. This explains why information is not sought in decision-making and even when available is ignored or suppressed (21:p.163). Underdevelopment is therefore more than a state of physical want. It is a state of institutional, societal or national "surrender to ignorance". This surrender is aided by packaged solutions administered via "slogans and ideologies of distant lands" (21:p.164). Performance is then assessed on the articulation of these packages.

Opaque performance standards permit the few local participants, project managers and the largely foreign corporations involved in projects to invest themselves with capacities they cannot deliver but over which they cannot be held to account. As this study will show, by adopting blue-print plans and black-box technologies, LDCs obstruct their learning opportunities, undermine their autonomous decision-making capacity, perpetuate their underdevelopment circle and prevent their institutions from participating in, appreciating and negotiating the compromises necessary for the management of change. Change is what real development is about. But managing

change is predicated on efficient and improving information management among a nation's environment enabling institutions.

Blue-print planning has contributed to a skewed urbanisation in LDCs (3:p.25) that starves rural sectors of resources. The result is congestion in cities, social tension, rising poverty and massive foreign borrowing. In Europe, the deskilling of rural craftsmen and peasants which accompanied industrialisation and urbanisation was complemented by reskilling of factory workers, artisans and industrial-age entrepreneurs. Poor communications led to better integrated economies. The transfer of resources from the primary (rural) sector to the modern (urban) sector had some logic. The industrial sector produced inputs like fertilizers and machines for agriculture. This raised output and released labour for the cities. The developments in agriculture were an integral part of the on-going change process. Changes also took place in the institutional frameworks, production processes and organisation aimed at meeting growing urban industrial sector needs. There was social dislocation and Europe off-loaded many of its people on the rest of the world. But there was a logic and complementarity that lacks in urbanisation in LDCs.

In LDCs, increasing landlessness, environmental deterioration and poverty in rural areas is forcing migrations to cities as well as the concentration of industrial activities in and around cities. Urbanisation is due more to "rural-push" than "urban-pull" factors.

Most notable is the lack of anticipatory regulatory and institutional adaptations forged from local peculiarities and intended to manage the change.

The result is the high opportunity cost of sidelining 80 per cent national populations from mainstream economic activity (18:p.30) and turning them into obstacles to development. Such large scale departicipation is costly (19:p.41). In Africa, only residual interest has been paid to institutionalising wider participation. This is epitomised in the metaphor of development as a "national cake to be shared". The "cake" was at the centre of independence slogans. However, recent slogans emphasise the need for an uninterrupted baking of a large and adequate cake before institutioning distribution. Amidst deteriorating economies and rising populations the distribution point remains unattainable. The need to address wider participation in the baking and distribution of the cake has become urgent. This requires institutional changes.

1.2.1 Putting the Pacific Rim in Context

The development landscape over the last three decades is littered with failures. Bad government, population explosion and natural disasters are only partly to blame. Also contributing has been flaws in intellectual perceptions of the development process and the prescriptions that have followed. The exception is changes in the Pacific Rim region of countries. The emergence of Hong Kong,

Taiwan, South Korea and Singapore was not foreseen by mainstream development theory because the contries lacked natural resources and did not fit commodity-based international division of labour growth models. Although now a focus for studies, these are still largely empirical. The model remains elusive. This study argues that this is due to the inability of existing models to accommodate the information element. The "miracle" of this region was founded on proactive national institutions that emphasised efficient operations, informed decision-making and consensus. They conceived the destiny of their countries as attainable within an international competitive framework. This ensured high attainment practices in institutions. This is evident in the regard accorded public sector organisations and institutions. It contrasts with other LDCs where perceptions of, for instance, the civil service, are unflattering.

The Pacific rim success formula was first forged in Japan. This country is credited with achieving an organic integration of Western technology, production methods and organisation with oriental cultural nuances of co-operation, patience and endurance. Confucianist values predominate the region. This has made it possible for these countries to transfer a tried consensus steeped in similar tradition. In Africa, the need for such a consensus bridge has not even been identified.

Sigurdson (24:p.142) points out that Japan acknowledged its lack

of natural resources early. It was therefore always eager to collect and process information about the external world in order to acquire negotiating advantages. He traces this propensity for informed decision-making to the Meiji Restoration in 1868. Japanese organisations have thus worked on the assumption that "information is their critical resource" as they have little else. This is evident in the orientation of government agencies, commercial companies and academia which scour the world for relevant information. It has enabled them to make timely, informed and competitive decisions. Sigurdson's conclusion is that the purposive, proactive and dynamic pursuit of information and knowledge is at the core of Japanese successful ability to adopt to and manage change.

Ventura (21:p.169) identifies the success of Taiwan, Singapore and South Korea as based on an opportunistic use of abundant cheap labour and good information described as "powerful social intelligence networks". This permitted full use of new opportunities.

Sigurdson argues that although information and knowledge management is identified as contributing immensely to the success of this region, no attempts have been made to measure or evaluate its real contribution to development. Thus, Japanese national characteristics receive attention but few have focused on how information processing helped shape the economic success story.

Sigurdson sees a "group-directed quest for knowledge" as forcing leaders to identify information and knowledge that their organisations may need and to remain accountable. This forces them to send out observation teams and invite experts for advice which they give due consideration. Transparent performance and accountability are thus embedded in this internationally driven arrangement.

Enos and Park (25:p.127) state that in addition to geographical propinquity, language similarity (particularly in written form), and recent experiences, South Korea chose "the Japanese development path" because it recognised that "the Japanese had already adapted Western technology to Eastern social and political mores". This is encapsulated in the slogan "Wakon-Yosai" (Western technology with the Japanese spirit). In sub-Saharan Africa this need to identify, smooth over and compromise local and imported mores has received little intellectual attention in organisational, management or sociological studies. Irreconcilable but wasteful conflicts and duplications have been the result.

Henriot (26:p.35) traces three stages in the Pacific Rim evolution: i) **Radical Asset Re-distribution** of land and imposing minimum curbs on its use in further accumulation of financial capital. This stage involved negative growth rates, but was seen as necessary to set the economic and political conditions that prevented highly unequalising economic growth based on land accumulation and

speculation. Land accumulation predominates development paths of Latin America and sub-Saharan Africa. Setting aside large tracts of land for commodity production creates static self-perpetuating institutions that obstruct change. They weaken the national capacity to respond to opportunities created by international realities;

ii) **Massive Accumulation of Human Capital** in excess of immediate demand for skills. In this stage, ownership of human capital is re-distributed, human resource base vastly enlarged, and both economic opportunities and political pressures for the next stage are generated. In the Rim, this stage was accompanied by relatively slow rates of economic growth and, even political instability, social tension, and unrest forcing institutional changes;

iii) **Rapid Human-Resource-Intensive Growth** after the investment in human resources has been made. An aware human resource base demands the formulation of transparent economic policies that encourage participation in economic activity. In the Rim, production strategy focused on export markets. These are competitive and transparent markets because of the limited ability of any single country to fully manipulate them. Also involved was transparent and accountable planning with genuine government development plans implemented, adhered to and reviewed objectively. Transparent and documented planning and external markets enforce a culture of attainment, accountability and objective evaluation in national environment enabling institutions. In addition, a well

documented landscape permits the formulation of clear goals and rules of operation.

The experiences of the Region indicate that informed and intelligently formulated and flexibly administered policies can break the underdevelopment circle. It also emphasises widened participation without which "growth in an economy can only reach a certain level and then be stymied" (19:p.41). The experiences point to a comprehensive and holistic approach to the management of change and development accomplished by informed institutions, ready to learn, and a large supply of skilled labour. It argues for an appropriate mix of education, public facilities, access to credit, and land reform. Investment in wider participation led to higher productivity and wages in organised and self employed sectors of the economies.

Smith et. al. (27:p.132-3) also identify three ingredients:
- an emphasis on **Mass and Higher Education** as exemplified by South Korea and Singapore's pursuit for "graduate-crammed populations to create the wealth of the future". Their investments in universities aim at both narrow specific demands for technical skills and at the production of multi-disciplinary graduates, capable of handling the kaleidoscopic shifts of information-based economies while avoiding the pitfalls of the two cultures (rich and poor classes) of the Western world as well as the dual economies (modern and traditional) of South America and sub-Saharan Africa;

- **Consensus and Compromise** as a means to progress for the benefit of all (27:p.3), as opposed to confrontation, adversarial or obstructive management styles, exemplified, for example, in Africa's interpretation of Western competition. Negotiated consensus has produced "a rare breed of competitive capitalism and one party socialism" in which governments set the strategy and invest public money in infra-structures like housing, education, transport and telecommunications. Business then builds national wealth on that foundation. This is the framework recommended by the futuristic French government sponsored Nora Minc study published in 1978. It advocated "a broad, long-term national strategy, rooted in consensus" (27:p.133) as vital to the pursuit of a post-industrial economy that sidelines ideology "because wealth is created with a minimum of capital and labour" and information from immediate and multiple sources takes centre-stage (27:p.133). Nora Minc saw this development as throwing "the traditional games of power into disorder". Thus only consensus through negotiations, locally and internationally, would define future progress;
- an ability to **Manage Constant Change** in government institutions and social attitudes that enable the countries to cope with accelerating technological change better than similar economies elsewhere. The economic advantages of adaptability are set to increase with expanding international communications that are putting growing pressure for change on countries (27:p.135).

In sub-Saharan Africa, distribution-based development strategies

were pursued with restricted flexibility because they were parts of ideological packages. They failed to consider local peculiarities. Thus Tanzania's policy of "Ujamaa" was inward-focused and inclined towards autarky. The pursuit of autarky however does not accommodate an independently defined system of performance evaluation that would force improved attainment on national institutions.

1.2.2 Redefining Dependency

Henriot (26:p.31) defined dependency as a situation in which major decisions which affect socio-economic progress within a country, like commodity prices, investment patterns, and monetary relations, are made by individuals and institutions outside the country or a situation in which the economy of such a country is conditioned by developments in another country. The reality of dependence is thus in decision-making. But decisions are based on inputs of information on ones environment. This puts information at the centre of the definition of dependency.

The dependency structure of LDCs begins with the disintegration of viable institutions in the society which follows contact with a powerful external social influence. The historical origins of this initially coerced arrangement is well documented (28,29). In sub-Saharan Africa institutional disintegration begins with slave trade and colonisation. This is followed by establishment of plantations and exploitation of minerals by foreign companies and investors.

The institutions created to enforce and support this arrangement distorted market realities. This is the foundation of the post-colonial institutions that have proved unable to cope with open markets. They were designed to contain and subjugate and not to conceive and implement change.

The institutions of containment cultivated the tradition of uninformed decision-making which has continued at post-independence. These emphasise familiarity with and dexterity at manipulating routine procedures. This is because containment does not tolerate challenge and is inward looking. Unlike in open markets with many uncontrollable variables, here the unfamiliar is ignored, denied or expurgated. Having to cope with the unfamiliar and the accompanying uncertainties of the situation create the need for information in order to reduce the level of uncertainty. Institutions that confront uncertainty take on a learning mode and constantly seek for and process information about the environment. In LDCs the institutions, unwilling to learn, have opted for imported pre-packaged solutions in the form of blue-print plans and black-box technologies. This has killed the urge to learn.

This scenario is repeated on the technology front. For example, it was superior African mining technology and skills that first gave Europe the idea of acquiring skilled African miners as slaves to operate the gold and silver mines of South America. Acquisition or abduction of skilled manpower to relocate a capability or

reproduce a skill difficult to copy is not new in history. The Japanese, for instance, unable to replicate the pottery skills of Korean Punchong ware, kidnapped entire potters' villages during the 1592 war. Some of the descendants of these Korean captives still practice ceramics in Japan. The rush for German scientists by Allied armies after the last war is a similar act.

But the African scale became destructive. Between 1451 and 1833, over 160 million people were forcibly removed from the continent as part of slave trade. As the most productive members of society the process accelerated disintegration of communities and destroyed indigenous technologies and their institutions by forced removal of practitioners. It also retarded primitive capital accumulation over centuries, annihilated productive capacity and prevented the evolution and development of technologies, skills and institutions (10:p.16). In contrast, it provided for primitive accumulation in Europe and North America that funded the industrial revolution and laid the foundation for an unequal and destructive trading relationship.

Colonialism intensified the inequality. The spread of new industrial technology and the emergence of European and US rivals to Britain had sharpened competition for foreign markets. Formal colonisation for monopoly markets and cheap sources of industrial raw materials and labour followed (10:p.17).

The colonial system rested on a new capitalist international division of labour and was based on a contrived framework of comparative advantages in which imperial countries specialised in manufacturing activities and the export of manufactures and capital to the colonies. The colonies were coerced into specialising in primary production of agricultural and mineral commodities for the colonialists' factories. Local manufacturing in the colonies was banned to preserve raw materials and markets for Europe. Indigenous craft technology, under attack since slave trade era, now atrophied through the disappearance of raw materials and local markets (taken over by Europe), prohibition of practice, and the non-absorption or reskilling of the displaced craftspeople into the new industries (10:p.17).

The peripheralisation of indigenous institutions, skills, knowledge and technological capacities has continued in post-colonial Africa. It has been exacerbated by heavy foreign investment and involvement of MNCs in the definition of national development agendas and decision-making mechanisms. Craft skills have not evolved to artisan levels nor has the deskilling caused by automated mass production been complemented by upskilling or reskilling in other sectors of the economy (30:p.15). With recent studies confirming that modern training is not advancing national technical capabilities, it is now evident that the process of skills growth was seriously dislocated. Remedial measures are failing because implementing blue-print plans does not advance local decision-

making and learning capacities.

It is at the point when a country is unable to define for itself where it is going or wishes to go that dependency, according to Ventura (21:p.164), becomes complete. Mimicry and fawning then dominate the operations of national institutions and the quality of performance is ignored (21:p.163). The institutions responsible for managing development mimic imported strategies, tactics, tools and ideas without any consideration for disparities in social structures, cultures and values. These should constitute inputs in the definition of goals. National thinking and learning stops.

Dependence is therefore defined at the realm of decision-making rather than the international division of labour, traditional forms of comparative advantages, or material conditions. To be able to take advantage of change requires an ability for informed and autonomous decision-making inclination and capacity.

The dominance of MNCs in the innovative sectors of consumer goods, machinery and equipment, electronics, computers, chemicals and drugs has strengthened the cause of dependent co-operation in LDCs as a pre-condition for keeping the industrialisation process moving. But without a framework in which options are carefully identified, capabilities nurtured, and improved terms ably negotiated for, the arrangement, as shown, degenerates into a

dependency trap.

1.2.3 Self-Reliance, Information Management and Institutional Capacity

Inter-dependence between nations is a cornerstone of world trade. However, it becomes dependency when dominant countries can expand and be self-sustaining, while dependent countries only grow as a reflection of that expansion (29:p.68). Thus the production focus of a dependent country is geared primarily to the dictates of the dominant nation. The result is an unintegrated dependent economy (26:p.31).

But the relationship depends on options, selection and decision-making mechanisms. As Henriot (26:p.31) asserts, dependence does not just pertain to economic or social growth, but to the quality and nature of the decision-making process that defines control of the development process. The focus is thus on a country's capacity for, and system of, setting forth national priorities and decision-making as an integral part of the development process. Therefore, self-reliance is at the level of "autonomy in decision-making" and the choice and means for full mobilisation of a society's resources that are under its own initiative and direction (31:p.455) The essence of development is founded on institutional reforms which focus on advancing the process and quality of decision-making in national environment enabling institutions. The optimality of the development path identified by such institutions on the basis of

reliable and up to date information helps decide the pace of the process. The underdevelopment circle is therefore a product of national institutional arrangements and decision making processes based on information management

Mabogunje (19:p.45) identifies a failure of African countries to "correctly assess the nature of the situation facing them" as responsible for many development problems. Such assessment failures are a product of ill-informed or under-informed decision-making. The responsibility for this falls on national institutions. But, as Hyden (17:p.17) states, "institutions operating in Africa were established by colonial conquerors". They remain extensions and replications of institutions of the metropolis and continue to serve the wrong agenda. They were created to contain and preclude the unusual and unknown and still operate accordingly. They obstruct change as a matter of course. In this learning is prevented. No information input in decision-making is needed because unknown scenarios are meant to be removed and not coped with. Only having to cope with the uncertainties of the unknown would create a demand for more information and improved knowledge of the terrain or landscape.

Arturo (32) has argued that institutional development (with its focus on intangibles like organisation, rules and procedures, evaluation mechanisms and standards) has failed to receive appropriate attention in development policy studies because, unlike

physical infrastructures, it is difficult to measure and fit into models. In any case roads, hospitals, schools, and telephone communications lines are tangible indicators that economists, governments and donor agencies can show for their efforts. However, failure to give attention to the intangibles has led to under-utilisation as well as misuse of the measurable physical inputs.

Institutional development provides a framework of analysis that would clarify the causes of poor performance despite costly physical infrastructures. Arturo also argues that it would focus attention on a clear set of operational principles that can be applied across a wide range of programmes and projects. It is also an appropriate path for studying capacity building particularly in the public sector institutions of LDCs. Capacity building is a learning process based on information and knowledge acquisition and use.

One way to study institutional capacity building, and, by inference, national capacity building, is, therefore, through paying attention to their information management processes. The fundamental of organisations and institutions, as will be advanced in the following chapter, is information acquisition, storage, processing and dissemination.

Arturo advances the view that more effective institutions operate

on highly specific goals, methods and criteria for evaluation. The more specific these factors, "the more intense the effects of good or bad performance" (32:p.49). Poor goal specificity and opaque evaluation criteria are, as indicated before, characteristic features of underdevelopment that have been overcome in the Pacific Rim. To ensure transparency in evaluation procedures Arturo proposes forms of competition (or competition surrogates) to be included in institutional development processes. He sees this as important in permitting individuals and institutions to set appropriate incentives and effective performance criteria.

Underdevelopment, as Ventura (21:p.163) suggested, is a state of mind of a country and its institutions. It is not a simple consequence of environmental, social or technical impoverishment as some studies have portrayed. As Porter (33:p.73) also asserts, national prosperity that results from an effective development process "is created". It is not a product of natural endowments as defined by previous perceptions of comparative advantages. To create its prosperity, a country needs to negotiate for the best terms in a competitive international arena that is continuously changing. However, equitable negotiations depends on equitable knowledge and information. A country's knowledge level depends on the knowledge stocks of its institutions and how they manage the process of learning. National information management and learning thus defines the level of autonomy in decision-making and real autonomy or self-reliance.

The task of changing the institutions in which the "thinking of individuals finds expression" is part of institutional capacity building. The process needs to be deliberate and comprehensive. This requires political commitment if development is to be "the movement of the whole social system upwards" (19:p.46). Therefore, institutional capacity building also emphasises the centrality of government in the management of development, discussed further below.

Within the conceptual framework of development as change, institutional and societal cultural transformations are expected to occur as indicated by Schumpeter (13). But dependency theorists have also observed that international transactions affecting LDCs become exploitative at the stage of "acquisition and exchange" and not at production. This points to poor bargaining by LDCs. This observation argues for an enhanced capacity for international negotiations as a vital component to development. Development should thus include enhancing negotiating capability. But this requires good knowledge of global events which is predicated on good and objective information consumption by national institutions. The institutions require the orientation and capacity to draw up and implement intelligent decisions based on all available information and experiences (15:p.x).

Ventura (34:.p.110) reiterates that it is ignorance that undermines

self-reliance. He identifies "an astonishing lack of knowledge about themselves, their friends, their enemies and their technological, social, economic and ecological environment" among LDCs. This undermines meaningful negotiations in the international arena. But the ignorance is partly self-inflicted. Despite a costly information infrastructure of libraries, documentation centres, telecommunication networks and computers plus efforts at information acquisition, much information is dormant and unused. Much stored data is never processed into usable information.

This is because the enabling institutions are not organised into dynamic systems that aid and make informed decisions. The infrastructure of physical institutions only serve to "adorn national prestige". The resultant widespread practice of uninformed decision-making only serves to undermine self-reliance.

O'Brien and Helleiner (35:p.3) point to the "quality of information input in national decision-making" as influenced by the "institutional arrangements through which it is collected, communicated and processed". This view is echoed by Sagasti (36:p.174) who identifies "cognitive dependence" as underlying the dependency relationships of LDCs. This perpetually undermines the opportunity to autonomously arrive at optimum development decisions.

While proposing intelligence in national decision-making, Piganiol (37:p.184) argues for its diffusion. He states that "intelligence must have a collective character", be "widespread, and therefore communicated, disseminated and shared". He advocates "national mechanisms" to be used for creating and spreading such intelligence. These "mechanisms" are the "national institutions".

Therefore, weak institutional, and by inference, information, knowledge and autonomous and optimal decision-making mechanisms in underdevelopment and dependency have been recognised. What is more, empirical studies of Japan and the Pacific Rim economies point to their lack of natural resources and their effective employment of internal and external information in autonomous decision-making. Their progress is characterised by limited use of blue-print packages that dominate African development planning (21:p.169).

What is lacking is an explicit articulation of a holistic development statement that unequivocally places information in the development equation. This framework would make it possible to study the process of capacity building in institutions and nations in a way that has so far eluded development studies. It is already accepted in mainstream thinking that capacity building is a better way of appreciating the development process. What remains is incorporating the intangible aspects of capacity building and learning into formal, measurable and testable models.

Institutions acquire, process, store and disseminate information and national experiences. In this they provide the impersonal but social framework of national memory, learning thinking and decision-making. The next chapter will look at how the discipline of information science supplies tools to study intangible aspects of capacity building. This is intended to add a new dimension to the understanding of the development process. It is an argument for re-conceptualising the whole development process.

1.2.4 The Case for Reconceptualising Development Studies

There are on-going efforts to re-conceptualise the development process in the light of current knowledge, past experiences, scientific developments, the international realities and the information age. There are calls for a multidisciplinary approach to the exercise. These have been strengthened by the informatisation shifts that have undermined neo-classical development paradigms (38:p.8).

Mabogunje (19:p.49) points out that blue-print plans "reflect the social, historical and national backgrounds of its authors". Thus some emphasise the need for a society to forge its own programmes. Others point to the need for more comprehensive mobilisation of people in development. Also advanced is improving capacity for better decision-making.

Past mistakes caused by fitting realities to blue-print packages is acknowledged. Also faulted are theories characterised by a "metropolitan world view preoccupied with the comprehensive elegance and logical consistency of the intellectual construct" (19:p.49). Such intellectual constructs have blinded theorists to reality. Lamberton (38:p.2) notes "widening cracks" on these "fine theoretical structures" previously endowed "with breadth, systematisation and elegance, amenable to mathematical precision and grounded ideology". On Africa, Hyden (39:p.696) states that the "generalising predilections of the social sciences needs to be tempered by the humanist concern about the unique and exceptional qualities of life" to avoid the "stereotypic and lopsided views already circulating in intellectual and political circles".

Sunkel (1:p.15) points to the need to raise the unit of economic analysis beyond the nation-state. Drucker (40:p.12) notes the fundamental changes in the world economy that have left economic theories behind and argues that comparative advantages can no longer be based on labour costs or rare commodities or minerals but on "exchange rates". He suggests that LDCs can no longer realistically hope to finance their development by raw materials exports or low labour costs. LDCs therefore need to learn to negotiate "more complex and internationalist formula of production sharing and subcontracting" (40:p.13) as the emerging information dominated "symbol economy" takes hold. This symbol economy is founded on the electronic-based information and communication

revolutions. A new development paradigm needs to incorporate this revolution. It also requires flexibility to cope with the fast changes that characterise this revolution.

Mabogunje (19:p.50) proposes "a new spatial focused development strategy" founded on the premise that every LDC "has within its boundaries the two most important resources for development - productive land and the labour of its population" (15:p.29). He sees the development process as a country's "application of rational thought to the mobilisation and utilisation of the two fundamental resources to improving the material conditions of its people as a whole". He faults past paradigms for an undue focus on capital and a concern for what can be done for people "rather than what the people can do together for themselves (19:p.29). Mabogunje implicitly advocates self-reliant decision-making and choice of development options.

Hyden (17:p.193), notes an emerging synthesis in the literature on development conceptually broader than development economics. The synthesis "recognises traditional culture as intrinsic to development, as something development should enhance rather than as a nuisance to be ignored analytically or brushed aside politically". It embraces history. The need for a new conceptualisation and paradigm or set of paradigms for sub-Saharan Africa is emphasised because current ones have proved irrelevant and what is "theoretically interesting is out of touch with the

praxis of society" (17:p.193).

Fransman (41:p.59) points to a "new technological paradigm" that is re-interpreting the industrialisation process. Based on technical change processes, it is in tune with the global information revolution. He traces its origins to four major events:

- the rise of the Pacific Rim newly industrialised countries (NICs);
- the decline of the dependency theory;
- the decline of the neoclassical theory; and
- the emergence of a new paradigm labelled as **neo-Schumpeterian.**

The emergence of the Rim NICs has proved that accumulation in the periphery and breaking the dependency circle is possible. This undermines the dependency assertion that development is impossible because the international division of labour is increasingly untenable.

Neo-Schumpeterianism accommodates the process of change. This contrasts with the analysis of equilibrium states of neo-classical studies. It considers instabilities as inherent in the change process accompanying industrialisation and development.

Change and instability are accepted as an integral part of the competitive nature of industrial operations in developed countries.

Here, industrial survival revolves around increasing competitive ability of domestic manufacturers. Achieving rising competitiveness means instigating and coping with constant change. Organisations and institutions in developed economies accept this as the price of survival and advancement. But LDC institutions are configured to resist change. Neo-Schumpeterianism helps illuminate these contradictions.

To cope with attendant instabilities of change requires an enhanced capacity to anticipate. This can be attained by "investing in social innovations and change and accepting that creation is accompanied by some degree of destruction" (11:p.17) or "creative destruction" (1:p.17). Hyden (17:p.2) points to the lack of preparedness and acceptance of development as consisting of "changes in behaviourial and institutional patterns that sustain growth" as obstructing African development. This reality of development as a process of national behaviourial and institutional change also underlies the development contradictions of oil exporting LDCs.

The emergence of money-surplus LDCs after the 1970s weakened theories that singularly identified capital accumulation and savings as development cornerstones. As a result, Hyden's prescription of "the emergence of an indigenous capitalist class with power to break down the structural constraints inherent in the **peasant mode**" (39:p.693) also appears flawed in the light of

the OPEC (Organisation of Petroleum Exporting Countries) experiences. Without behaviourial changes resulting from improved learning and knowledge, surplus money is deployed in pursuit of containment rather than change.

The contrast in the institutional and, therefore, fundamental change differences between OPEC and the Rim NICs has given room for propagation of an alternative framework. This is intended to avoid the high human cost accompanying the undirected private accumulation path advocated as inevitable by neo-classical theories. This is the path followed in Latin America and much of Africa. The failure so far, of the over-resourced OPEC members to package a successful development formula, and the progress of the resourceless NICs weakens the assertion that accumulation and savings is the missing link in the LDC's **take-off** chain. Development path options now range from participative "East-Asianisation" with its minimal social costs or departicipative "immiserizing growth" along Latin American lines.

The colonial legacy of inappropriate institutions created to contain and ensure stability rather than nurture change and development is crucial. In the absence of a dynamic, adequate and experienced national private sector, the management of change and the accommodation of accompanying uncertainty and disequilibria, falls disproportionately on the institutions and bureaucracies of the public sector. It is the public sector bureaucracies that set

the tone for change in the Pacific Rim. They managed this through a preparedness to accommodate accompanying social disruptions required for development. This was managed through a proactive posture and efficient information management to help cope with the attendant instability. Therefore the emphasis by colonial and post-colonial institutions of Africa on "control rather than development" (17:p.19) is a major problem.

The promotion of foreign blue-print solutions and performance standards has delinked the operations of institutions from mainstream national aspirations. It has also helped to cloud the fact that they often pursue programmes and policies that undermine national good. They do this by obstructing the flow and diffusion of information in pursuit of stability. But this slows national learning. It also undermines long-term national integration important in multi-ethnic, geographically spread states.

As indicated, this underlines the importance of the role of government in navigating development (42:p.12). After all, the the economic miracle of the Rim has been credited mainly to intelligent government and capable institutions. But the centrality of government in LDCs is also because (42:p.12):

- domestic capital formation is at a low level in most LDCs;
- the private industrial sector is weak;
- the economies are dualistic and unintegrated;
- economic and financial resources are concentrated in the public

sector because of taxes levied on foreign trade and export commodities. Thus only the state can mobilise the financial resources to develop social and physical infrastructures necessary for national information management and carry out large industrial projects with long pay-off periods or requiring capital in foreign currency;

- the need for foreign capital means that the government must become involved in negotiating terms and conditions with foreign banks and contractors and in regulating the pattern and volume of capital flow;
- it employs, and can requisition, the largest pool of the country's manpower resources and expertise;
- it still remains the only viable institution in LDCs that current international banking practice recognises as collateral.

The state also has a responsibility to gather and make available the data and information required for long-term national management. It is responsible for ensuring that such information widens participation in development. Government is a legitimated instrument of force given a right to institute and regulate change. Thus the government remains important to development management. But, as Lewis (4) pointed out, intangibles like capable government, institutions, procedures, regulations and systems for participation in the development process are difficult to fit into models and/or study.

An empirical study of institutional operations is possible (43:p.589). This study takes such an approach by looking at how Kenyan institutions managed two technological projects over a ten-year period. The approach is founded on the assumption that government, institutions and bureaucracy implement programmes through the management of information. This logic is advanced further in the following chapter.

1.2.5 Conclusions

This chapter concludes with a proposal for a new development paradigm that incorporates the element of information in national institutional capability building and development. As is pointed out, the lack of awareness of opportunities available sustains underdevelopment by blinding society to the need to improve national awareness. The national ability to bargain for domestic consensus and optimal international terms of trade is however central to economic growth. Only economic growth can ensure the resources to finance participative development and sustainable growth. But this depends on a national capability to access and make use of the world's information and knowledge in defining national goals and making optimal decisions based on complete awareness of national resources. To best serve national interest, a country needs good information and knowledge on financial, technical and trading markets. This means the ability to monitor international changes and to make an objective inventory of internal capabilities is vital.

The international scene and markets are particularly unstable from the position of most LDCs who have little influence on events. The international division of labour and comparative advantages are no longer predicated on the endowments of nature. A country needs to define, shift and operate its niche beneficially under such arrangements. Faced with uncertainties, the information management capacity of national institutions becomes important. As Tell (44:p.153) and Helleiner (45:p.30) have also concluded, "uncertainty is a product of incomplete information". National information management is central to a country's ability to cope with the inherent uncertainties of development.

National information management supports a country in its efforts to negotiate a suitable niche in the international arena. As Manley, the Jamaican Prime Minister stated, LDCs must "accept the compulsion to become competitive partners in the world economy" (46:p.11). It is also crucial to the quality of decisions made in pursuit of change and in negotiating an internal consensus. Enos and Park (25:p.151-2) reiterate the centrality of negotiating, bargaining, and by inference, information management capability in LDCs. Their studies of technology transfer and industrialisation point to negotiations, even more than good technology selection, as fundamental to success. Technologies, they say, are themselves neither profitable nor unprofitable, "it is the terms on which they are obtained that determines profitability ... where the deal is

struck". Therefore, national information management, as will be argued further in the following chapter, is also central to effective technology transfer.

Mabogunje (19) indicated in his spatial framework for development that information flows defined the level of integration and productivity of a society. Agrell (47:p.38) advances this logic by stating that a modern society built on science and technology is even more dependent on a continuous flow of detailed accurate information. The intensity of information flow is thus, at least conceptually, a surrogate indicator of the intensity of the development process. The more complex and sophisticated a society gets, the more intensified the information flow. National information management as a way of enhancing information flow is thus an important dimension of the development process.

But Agrell (47:p.84) also adds that increased information flow makes "each sector of society more transparent to observation". He thus suggests that an advanced national knowledge industry, looked at in the next chapter, serves to advance national transparency to observation. Transparency to observation, he argues, is a characteristic of developed economies. National information management efforts aids transparency and, by this logic, advancement.

The conclusions are that development process needs to be

reconceptualised. But important to the reconceptualisation is an explicit inclusion of the information element in the development equation. It is within this framework of information in development that this study of Kenya's technology transfer, industrialisation and development efforts is carried out. The discipline of information science is used to look at the national framework of institutions that address technology identification, selection, acquisition and transfer. The focus is on the intangible attributes of informed decision-making, learning and memory within the social, organisation and institutional arrangements in Kenya.

Next chapter looks at the epistemological framework of information science in national information management, technology, the transfer process and development.

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2.0.0 INFORMATION MANAGEMENT, TECHNOLOGY TRANSFER AND DEVELOPMENT

2.1.0 Introduction

This chapter presents the conceptual framework for information management based analysis of technology transfer in the North-South context. Technology is considered a product of socio-economic and political environment representing the information and knowledge of a society used to accomplish tasks, render service, or manufacture products. It is a product of compromises among the competing interests in a particular society. The competing interests are projected and communicated as information flows. Technological artifacts therefore represent a society's packaged compromise of such information flows.

It will be argued that outsiders to Western technology evolution should not assume that it is universal in character. They therefore, need to analyze and unpackage the technology they import in order to introduce modifications to its various components and make them address the needs of the new terrain or landscape.

This chapter gives the epistemological foundation and justification for this study. It argues for a study of technology transfer process within the interdisciplinary conceptual framework of information science. The approach emphasises the need to recognise and adapt to change.

2.1.1 The Changes

There are changes in the international scene that call for a re-evaluation of past approaches to economic transactions. These changes, attributed to the information economy, are altering the fabric of world trade. For LDCs this means learning to cope with the unknown in circumstances already difficult.

Drucker (1:p.6) refers to 'uncoupling' changes in international economics. This has weakened the link between primary- and industrial-products economies and led to a situation in which the movement of capital rather than goods determines economic performance. It has altered the rules of international commerce. But conceptual recognition of the reality is still lacking (1:p.7). Drucker points to gaps in theories on international trade, technology transfers, and development.

World commodity trade has been a victim of technological improvements. As a result of improved operations and reduced waste, raw material input per given unit output is falling as outputs rise. High-technology and bio-technology have also introduced cheap, better quality substitutes and processes. This has marginalised commodity economies and weakened traditional development policies.

Manufacturing output is also not directly linked to levels of employment, especially, 'blue-collar' labour. This has technology

transfer implications for LDCs. Employment can no longer be guaranteed to rise with levels of manufacturing. Cheap labour is not, therefore, a crucial factor in the location of production facilities or the price of final product.

The options are also limited. Drucker warns that resistance to change could lead to a total loss of production facilities in this increasingly competitive and open world (1:p.10).

The link between goods and services and the symbols of money, credit, and capital are also drifting apart in global trade. In the new symbol economy, exchange rates between major currencies have become an important factor of comparative advantage in international trade. This makes the inconvertible currencies of LDCs a bigger problem than before.

But the reality of such changes has yet to appear in economic, development or trade theory. Traditional comparative advantages based on labour, raw materials, energy, and transportation do not suffice. It is increasingly clear, for example, that exchange rates influence comparative labour costs between countries although the exact mechanisms are yet to be explained.

The absence of a conceptual grasp of the changes makes remedial action difficult amidst already unfavourable arrangements. For example, in 1985, the US manufactured 20 per cent of world's

manufactured exports, West Germany accounted for 18 per cent and Japan for 16 per cent. This totalled over 50 per cent of global production. The LDCs with 70 per cent of the world's population and two thirds of the world's nations produced 11 per cent of the world's industrial products, and accounted for 20 per cent of the world's trade (1:p.8, 4:p.2). Without a full conceptual understanding of technical change and technology transfer management, corrections to this imbalance will remain elusive. Inserting the phenomenon of information in the conceptual equation advances the understanding.

2.1.2 Information and Economics

Machlup (2:p.217 defined economics as "the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses". Scarcity of means and resources and dealing with competing alternatives is thus the basis of economic conduct. Economics studies scarcity, choice, and optimal resources allocation. But these are activities requiring information as input in the ultimate process of decision-making.

Therefore, studies on information in the economy are founded on uncertainty, choice, decision-making and price mechanism in relation to optimal resources allocation or pareto optimality. Information is also at the centre of the concept of competition and free markets. In this framework information is the "intellectual product of human cognitive processing" or thinking, intended to cope with uncertainty. Uncertainty therefore

represents a lack of information and the process of acquiring information is aimed at reducing uncertainty. The value of the acquisition of a specific piece of information then equals the utility gained from selecting a better choice among terminal actions or pareto optimality.

Economics has, therefore, studied information as a dependent variable in models intended to explain price searching, purchasing when quality is uncertain, behaviour of insurance policy markets, financial markets and labour signalling markets (3:p.53). However, the focus of the studies remained narrow. In the 1970s activity centred on economic uncertainty surrounding aspects of functioning markets. Production did not receive adequate attention, except as a spin-off of new information technologies like computer aided manufacturing or processing. Information in the creation and enabling of production has not been adequately addressed. Katz (3:p.54) feels that because of this, inadequate attention has been given to relations between information and economic growth. But this is the approach that is required if a focus on information in development and the building of institutions that advance it is to be cultivated.

This approach contrasts with the literature on the post-industrial society. The latter is specific to developed economies and over-emphasises the electronic technology revolution and hardware, as opposed to organisation, institutions, and people which is required

to integrate information in development. Only after this can the potential benefits of the electronic revolution be exploited.

Lamberton (4) described the "economics of information and knowledge" as "an emerging topic of interest for both economics and management science" as it analysis the processes by which information and knowledge is produced, diffused, stored and used. He felt that the attention given to information by mainstream economics was inadequate (4:p.8).

Before economists incorporated uncertainty into the model for competition, models by-passed the problem of uncertainty in decision making. The firm or household was assumed to have available all information needed about the demand for its product(s), factor supply conditions, and technology. The consumer was assumed to know about prices, the characteristics of the goods, and his/her preferences. An economics of information and knowledge model recognises that an economic system is activated by decisions on many possibilities and surrounded by doubts (4:p.8).

Introducing information into the traditional concept of the economy however disrupts old perceptions of competition, optimality and equilibrium (4:p.9). It raises epistemological problems. Incorporating information in international economics has raised doubts about the reality of perfect competition in a world in which asymmetry in the production and consumption of information and

knowledge is widespread. Such information disparity permits oligopolists to coordinate their actions effectively. The resulting contrived stability undermines competition (4:p.10). The unequal information access to which LDCs are subjected makes international competition inconceivable unless this issue is addressed.

Addressing the problem is made difficult by the knowledge compartmentalisation of structured disciplines. In 1983 for example, Martyn and Flowerdew (5:p.3) reported on the unfamiliarity of economists or accountants with the field of information only surpassed by the ignorance of librarians and information officers of the fields of economics and accounting.

In 1984, Lamberton (15) therefore saw information economics as a response to deficiencies of economic theory built on unrealistic assumptions about the richness and sureness of information available to decision-makers, failures of government and business policies, and the advent of intelligent electronics with enhanced capacities for communication, computation, and control. He saw in this the emergence of a new paradigm that would transform economics and other social sciences. He argued that intangible attributes like information and organisation demand recognition as fundamental economic resources with the capacity for initiating, responding to, and controlling change. He saw this as having profound policy implications at all levels of decision-making.

The economist Kenneth Arrow put information in the framework of production, organisation and industrial management. He perceived information gathering specialisation as forming the basis of economic organisation. According to Arrow, organisation and division of labour aim at information gathering specialisation. Specialisation allows individual workers to acquire skills for a particular task more effectively by restricting the range of the task. But the resultant efficiency gain, he argued, is actually due to the lower cost of information permitted by such specialisation (5:p.6). Arrow, therefore, argued that individuals organised into organisations and institutions to permit effective acquisition and communication of information. He saw this as the basis of all organisations - private, public, charity, or profit motivated. The degree to which an organisation meets its set targets is, therefore, an indication of its effective information acquisition and communication effort. In 1990, Lamberton (6:p.4) added that the optimal design of organisations must therefore take account of the costs of information.

Hirschler and Riley (7:p.1393) considered economics of information as a study of the consequences of informational actions which allow individuals to overcome uncertainty. Information generation therefore becomes largely a disequilibrium-creating process, and information dissemination a disequilibrium repairing process (7:p.1414). They thus see the management of organisations as information generating activity (to induce disequilibrium, change

and growth) and information disseminating activity to cope with the attendant disruptions. Management is, therefore, essentially the management of information.

Arrow concurs. He points out that in the real world, the decision-maker is either a group or an organisation. The specialisation in information gathering by organisations is the means to attaining objectives (5:p.9). For efficient decision-making, Lamberton (5:p.14) advances the need to view organisation as a variable and that economics should draw on organisational and information sciences for appropriate concepts. He concludes that organisations are, in fact, information channels. Analyzing organisational needs therefore requires a focus on their information processing activities. He thus proposes a shift from the singular focus on legal and managerial aspects of organisations and institutions that is the prevailing practice. He sees organisations and institutions as incompletely connected networks of information flows (6:p.1).

Thus the focus of economics on information centres on organisations as economic variables, but within already operational systems like in developed countries.

2.1.3 Information and Organisations

Most major macrosociological theories associate information with organisations, society and the wider body-politic. Katz (3:p.50) points to this as focusing on communications as a multiplicity of

linkages that relate the individual to society. This approach implicitly considers information flows and connectivities within the societal context.

The resultant studies have shown, for instance, that media, domestic mail traffic and telecommunications can increase political participation, integration and nation-building. The studies implicitly advocate mechanisms for improving information flows to weaken geographical isolation and advance national integration and economic activity. They have a development orientation.

Early social theorist also conceived information as part of the cultural cement of political communities. Max Weber, for example, saw a common language and a communications technology as determining nationalism. Communications technology include the press and media which are means and tools for effecting information flows and permitting its sharing among members of a community. This framework recognises that all society, as Sturges and Neill (8:p.7) underline, is underpinned by "complex information systems at work". Karl Deutsch expressed similar views in 1957, stating that there can be no society or division of labour without a minimum transfer of communication (or information) (9:p.51). Weber saw the development and degree of communications as determining the level of bureaucratic administration that could be imposed on a society. When bureaucracy was first imposed on Africa however, such considerations were precluded.

Therefore, macrosociology studies recognise information at the centre of organisations, society and nations. The emphasis of study has changed with time. In the 1950s and 1960s the interest was on communications and information flows in nation building. This later shifted to communications systems and socio-political change. In the 1970s it moved firmly towards the "influence of information and communications on economic growth" (3:p.53). This was however derailed by the "cultural imperialism" arguments that underpinned the debate for the New Information and Communications Order (NWICO). The cultural over-emphasis blunted and lost sight of the issue of information in development.

The loss of economic growth focus of information studies is also reflected in studies originating in LDCs. Telecommunications, postal and computer diffusion studies in LDCs focus exclusively on such economic variables as telephone provision and economic activity. The role of intangibles like regulations, policies and information processing culture caused by, and affecting, change has yet to be studied.

Governments and their institutions regulate expansion of telecommunications, computing and frequency spectrum allocations. This affects, and is affected by, national information cultures which determine the intensity with which the physical infrastructures are used. Arturo (9:p.4) underlines this. He

states that it is easier to build highways, dams, and telephone lines than it is to set up and improve institutions that use and manage them.

However, the electronic-based information revolution of the 1980s shifted LDC attention away from institutional building and towards hardware acquisition. Most information policies in LDCs give undue emphasis on hardware acquisition. Little attention is paid to extant institutional operations that have led to under-utilisation of in situ infrastructures. The resultant post-industrial focus of current information studies has led to flawed perceptions of what the information sector actually consists of, particularly from the perspective of non-industrialised LDCs.

Information sector studies have been carried out in several economies. One of the biggest exercises was undertaken by the OECD in 1981. There have also been national studies covering US, France, Singapore, Australia, Papua New Guinea, Fiji and New Zealand. The studies were made difficult by the interwoven roles of information and organisation and the lack of an agreed terminology (5:p.23). The studies also failed to put information into the development perspective.

2.1.4 Information and Development

Katz (3:p.65) argues that state formation as a political entity follows its acquisition of the attributes of an institution. Many

of the attributes are symbolic. Success of the process depends on the capacity of the state to create and diffuse collective identities and loyalties among citizens. The symbols support the material attributes through which the state controls, extracts and allocates resources. Without its institutional symbolism, the physical systems would be more difficult to enforce. But symbolism requires an adequate communications mechanism. Therefore the technologies that support communications and information flows are central to the process of state building. Technologies here include all the mechanisms that enable information flows such as scripts, computers, telecommunications and radio. They affect the range, scope, speed and volume of territorial transmission and communications (3:p.69).

Technologies help convey, and therefore advance, the process of developing state attributes. The technologies support the transmission, processing and storing of information needed by the state to achieve control over national territory and extract resources from society.

But information technologies need to be diffused within what Katz (3:p.79) refers to as a "communications ecosystems". His studies show that information technologies only diffuse in an ecosystem where information flows are supported by previously available technologies. These are information technologies already supporting societal information flows. New communications systems

need to be devised in a manner that advances existing and newly created information flows. There are therefore problems with some information policies adopted by LDCs that over-emphasise latest hardware at the expense of existing information flow mechanisms. Lack of an organic marriage between the systems could impede the cause of societal information flows.

Weaknesses in policy perceptions of information in development have led to lack of information considerations in development planning and management. Sturges and Neill (8) refer to such circumstances in Africa. Here the information profession suffers low esteem and decision-makers, who do not use information anyway, remain unconvinced by the "reasoned arguments" of the profession that it is vital for development. The information credibility gap in LDCs permits the unrealistic pursuit of costly hardware acquisitions without prior internal information inventory that would clarify what Paez-Urdaneta (10:p.178) refers to as the level of "societary informatisation". This is the level at which a significant proportion of the population actively incorporates competitive amounts of information and knowledge into goods and services produced. It is what determines whether information technologies will be fully utilised.

Paez-Urdaneta (10:p.177) attributes the conceptual gap in information in development to the philosophy that equated development with industrialisation. It created the view that

improved access to international scientific and technological information was all that was needed. The information systems that focused on access however did not address the culture of incorporating and using information in official, public and industrial decision-making. But this "societary informatisation" is what "information for development" should be about. Raquel Salinas' (11) study of the Latin American debt crisis underlined the importance of information culture in effective utilisation of in situ infrastructure and in informed corporate decision-making.

What has evolved in LDCs is a culture of information as a social or academic service. This welfare perception has precluded its consideration as a competitive resource. The emphasis has been on supply of libraries and books rather than stimulating demand for development-related information. Arguments by the profession (8) remain unconvincing to an audience and system not structured for competitiveness and change. Without such a structure, the use of information in development remains remote.

O'Brien and Helleiner (12:p.2) have explained that during colonial times information was irrelevant in LDCs because decision-making was externally located. Since independence, there has arisen the need for LDCs to formulate and pursue policies that serve their own interests. This implies a search for new sources of information and expertise, new information systems, and new means for codification and use. But the results over the last

three decades indicate a problem.

O'Brien and Helleiner (12:p.3) refer to LDC economic institutions entering forms of bi-lateral and multi-lateral bargaining in which lack of information and expertise weaken their search for alternative markets and sources of supply. Despite the importance of improved access, the fundamental issue in LDCs remains "societary informatisation". The absence of information in decision-making and resource allocations and the poor image of the profession is an aspect of the issue of information in development. This set up weakens problem identification and the search for solutions.

Paez-Urdaneta (10:p.178) and Salinas (11) point to political and conceptual limitations on information and development contributing to under-utilisation of information already accessed under current policies. They fault the sociology of LDC institutions including incompetent and unstable governments, weak and under-financed universities, industries largely controlled by multinational corporations (MNCs), and a bureaucratic culture that spurns the process of institutional thinking.

Information socialisation (3) or societary informatisation (10) is an attitude problem. Attitude change, as argued in Chapter 1, needs to be founded on international realities, including perceiving LDCs as part of a wider competitive world. LDCs

problems thus need to be solved within a framework conditioned by factors not under an individual country's control. This means being as well informed as possible in order to optimise on the opportunities that may arise. But such changes need to be self-initiated and "from inside" (10:p.187).

The information sector of a country consists of existing technologies and the information workers. Katz (3:p.139) suggests that there are, therefore, "as many profiles of the information sector as there are countries of the world". This argues against LDC information sector policies that over-emphasise hardware acquisitions as was the case with the information policies of India and Brazil. Kenya's projected Informatics Policy also fails to give due emphasis to information in society. However, policies that emphasise the glamour of hardware acquisition do not address optimising the use of existing or new technologies. But such a focus is vital if national productivity is to be advanced and information is to be used as an instrument of development.

For this, national information management needs to be seen as the process of communicating and storing information in single and multidimensional ways supported by several technologies. Information transmission, processing and storage involves individuals, organisations and societies using multiple technologies deployed within communications ecosystem (3:p.80). Despite the concept of the "information society" being a spin-off

from events in industrialised countries, Katz (3:p.139) sees it as an analytical bench-mark against which different countries can be analyzed. He argues against it being considered a model to be followed in the pursuit of the "post-industrial" development phase. Post-industrialisation is a contradictory framework for non-industrialised countries.

Many information policies in LDCs appear founded on the misconception that the "information society" is a model based on a certain level of hardware infrastructure. What is required however, is a competitive use of information in decision matters affecting administration and production. Effective use of existing systems will ensure optimal use of additional systems (3:p.82). This is the "societary informatisation" upon which to build an LDC information sector. It is the basis for information in development.

2.1.5 Information and Technology

Technology has been defined as knowledge and information that makes possible the accomplishing of tasks, provision of services or production of goods. It is a systematic application of a society's collective rationality to an identified need. Collective rationality implies compromise. Functional compromises are often packaged as rituals, tools, machinery, process or method of doing things. Thus the compromises take material forms as tools for productively coping with nature.

Fransman (13:p.23) refers to technology as activities involved in transforming inputs into outputs. This perception looks at production and technical change. By focusing on the transformation process itself, the approach looks at "what goes on inside the 'black box' into which inputs go and out of which outputs come". Technical change, as argued in Chapter 1, focuses on the process of change which is central to development.

Productivity determines the maximum output that can be achieved with any given quantity of inputs. But productivity is determined by the state of existing technical knowledge. Knowledge, however, has to be created or acquired at some cost. In any case the search for knowledge and information is fraught with uncertainty because it is difficult to predetermine the quality of what is being acquired. Transforming inputs into outputs involves knowledge of how to do things - although not necessarily why things work in the way they do.

Machlup (14:p.642) considers information as denoting being "apprised". He links information and knowledge at the macro-social level. Machlup sees knowledge as deposits of information and the structures and patterns that tie them together. Knowledge therefore includes responses to new information stimuli and the process of learning. The process of integrating a growing body of information in society constitutes its shared fabric of knowledge

or aggregate mind. It is this aggregate mind that underpins cumulative learning in society.

Machlup (14:p.644) argues that information can be acquired by a stimulus, like being told, while knowledge can be a product of thinking. Thus information is a process and knowledge a state that gives capacity for creativity, invention and productivity. Therefore, the process of production is implicitly an information activity.

Fransman (13:p.40) sees buying, productivity and selecting as sources of information. He suggests that acquisition of improved components or better skilled labour introduces new information into an organisation creating new possibilities. Production itself generates information flows which may form the basis of subsequent or improved actions. In addition, in a competitive environment, information on the activity of rivals provides an opportunity for "learning by imitation". But Fransman (13:p.41) also refers to "learning by doing" as a product of information flows generated by buying producing and selling.

However, the quality and quantity of information generated depends on the degree and effort allocated to facilitate the flows, such as improved response. But this implies costs. The opportunity cost of acquiring new information and knowledge is complicated by the inherent uncertainties of the acquisition process (13:p.41).

The lack of a clear causal link between new information flows, learning and technical change draws attention to conditions necessary to optimise new information. These are determined by the existing information and knowledge arrangements of the society. It is the condition referred to by Paez-Urdaneta (10) as "societary informatisation" and by Katz (3) as "information socialisation".

The complex nature of the technical change process is exacerbated by the difficulty in isolating and controlling the large number of determinants that simultaneously shape it. Fransman (13:p.48) points to the absence of an acceptable explanation for differences in form and direction of technical change. He points to the importance of the state in the process. States encourage, shape and limit technical change and have an impact on generation and diffusion of technology. Katz (3:p.108) defines diffusion as the process by which new products, processes and ideas spread to members of a social system. Sources for technical change and technology are, according to Fransman (13:p.53), identifiable from market and non-market mediated flows of information. But, as argued before, information processing systems are country specific in nature. This makes generalisations difficult.

Fransman (13:p.55) points out that most technology studies emphasise market mediated information flows such as licenses,

patents and technology agreements. Not enough attention is given to non-market mediated information transfer, learning and technical change. This has contributed to the failure to integrate information search as part of technology transfer management. From an LDC perspective, search constitutes the first step in technology transfer process. Despite appearances of a terrain dominated by proprietary, and therefore market mediated, information, over 90 per cent of technology information can be gleaned from public domain sources. This is true of most types of information LDCs require for technology transfer.

2.1.6 Information and Technology Transfer

Fransman (13:p.7) defines international transfer of technology as a process where knowledge on production processes is acquired by entities within a country from sources outside the country. Enos and Park (15:p.26) see it as the acquisition
of the entire body of knowledge necessary to fulfil a specific task - usually the production of a commodity. Such knowledge covers manufacturing techniques, design, construction and operation of plants, training and improvements.

There is however, no holistic theory or model of technology transfer. Enos and Park point to scarcity of literature on technology adoption which they define as the "entire sequence of decisions made within a developing country determining how, when, where and with what consequences technology is employed". They

see technology adoption as a series of decisions, and therefore, information activities.

Existing technology transfer theories focus on inter-firm transfers. But this does not give attention to the whole macro terrain. In any case LDCs tend to be dominated by MNCs making such transfers intra-firm and creating a false picture. What is more, indigenous firms are too few to give an adequate magnitude for such a study. In addition, indigenous firms in LDCs rarely participate in the technology scenario. The inadequate numbers of indigenous firms make them a weak mechanism for diffusing imported technology into the wider economy. This therefore leaves a gap in North-South technology transfer studies.

Technology transfer theories can also be faulted for assuming that knowledge and information is acquired instantaneously and without cost. As a result they represent the local environment simply as different sets of relative prices. This ignores the challenges of absorbing new technologies in LDCs. What is more, the theories also assume a monolithic system of decision-making. However, decision making in LDCs is characterised by bottlenecks, government regulations and controls, conflicts of objectives and self-interest, ignorance of risks, information asymmetry and uncoordinated and compartmentalised decision-making (15:p.18).

Current thinking attempts to capture societal learning through the

framework of "learning-by-doing". But Enos and Park describe this as a "rogue theory" because learning is not costless. But learning-by-doing offers a framework for analyzing capability building. Capability building requires a system and mechanism for diffusion but the limited number of firms in LDCs is a handicap for diffusing information, knowledge and good practices throughout an industry or economy. Although technology transfer theory based on the firm suits developed economies, it us weak when applied to LDCs (15:p.25).

The debate on the appropriateness of imported technologies has received much attention. It has led to arguments for imports of intermediate or second-hand technologies by LDCs unable to cope with the latest sophisticated technologies. But this has been seen as an obsolete technology trap that funds new technology in advanced countries. It saddles LDCs with uncompetitive and inefficient technologies that retard development.

The appropriate technology debate remains unresolved. For instance, Kenya's Association of Manufacturers still argues for the withdrawal of government restrictions on second-hand machinery imports. This has gone on despite studies that have, for example, diagnosed Kenya's textile industry as suffering from off-loaded uncompetitive technology (16).

A problem with the appropriate technology debate is that it begins

at importation stage and emphasises final products and maintenance logistics rather than learning and competitiveness. It also focuses on complete technology packages and not its component parts important in technology adaptations. The debate also pursues a uniform blue-print culture for LDCs. Packaged solutions, as argued in Chapter 1, undermine development.

Ventura (17:p.167) states that for most LDCs all scientific and technological information has to be obtained from outside sources. Djeflat (18:p.149) expresses the same view. What is missing is a consensus on the means and ingredients to be considered.

Technology is a commodity not traded by the rules of the market. But these rules are embodied in the models and debates of technology transfer. Market rules fail because of information and capability asymmetry in technology transactions. Technology is transacted under the following properties:

i) Incorporated in the form or "package" of a product or material like machines, equipment or direct material,

ii) As information on the constituent parts such as patents, licenses, blue-prints and conditions of use;

iii) As a cost or price issue.

Djeflat (18:p.152) refers to UNCTAD dividing technology into:

i) Capital goods and direct material;

ii) Qualified and specialised manpower;

iii) Technical and commercial information.

The six classifications view technology as information, knowledge, skills, prices and packaging. Technology is marketed as either a complete entity or package or fragmented and unpackaged. Whatever form it takes depends on negotiations. But the nature of the negotiations is decided by the buyers knowledge and technical capabilities. Transactions are also determined by the structure of the technology market. This affects the negotiating strengths of the parties and the final contract.

Technology suppliers are often MNCs. These have the option of transferring technology through a subsidiary (internal arrangements) or to outsiders. But the buyer needs information and knowledge to unpackage the technologies, explore possible local inputs and alternative markets, and remove superfluous elements and costs from the contract.

Djeflat (18:p.155) identifies packaged, unpackaged and "turnkey" contracts. Although intended to guarantee deadlines, quality and quantity, packaged contracts commonly result in cost overruns, failed deadlines and very limited experience and capability transfer. The resultant supplier domination of decision making precludes local economic considerations like employment and sector integration. Unpackaged contracts could lead to long completion times, high costs and "self-delusion" as when the unpackaging is

peripheral and does not cover the core technology. This is the case with the local component sector of Kenya's motor industry referred to in Chapter 5.

Channels for importing technology also depend on buyer capability. Foreign direct investment, popular in Kenya and Africa, does not require much knowledge in the importing country. But joint ventures have not done better because often the management has been contracted to the foreign partner who then also supplies or sells machines and expertise to the joint-venture. Such organisations are only joint ventures in name.

Except for the Pacific rim, technology transfer experiences in LDCs have not been encouraging. Djeflat (18:p.159) faults the mercantile instincts and lack of experience of LDC entrepreneurs. He also identifies a lack of time-specificity for project completion and the exclusive control by foreigners of technology related decision-making. As a result, technological information is withheld from LDCs and local operators are restricted to handling peripheral administrative aspects of projects or contracts.

This arrangement allows foreign partners to steer purchases of capital goods towards their affiliated group, company or country. This does not lead to access to the most competitive technologies, suppliers or practitioners. This is evident in Kenya's sugar,

textile, and motor industries (16,19). Even where open tendering is required inadequate information is made available and negotiations restricted to respondents. However, not all technology players respond to tender requests from small countries. LDCs need to seek out as many participants as possible. But often, regulatory bodies, like Kenya Sugar Authority, restrict transactions to a static centrally held list of suppliers. Such acts dilute the international market benefits that may accrue to the country.

Djeflat (18:p.164) concludes that technology transfer contracts over the last two decades have resulted in supplier control and contravened free market rules. But the problem has been created by information and negotiating arrangements. Djeflat identifies real and contrived supplier oligopolies and monopolies in international technology trade aided by buyer ignorance. Suppliers tend to have all the information, are aware of all choices and make decisions on behalf of buyers. Suppliers also have broader and longer experience in negotiating international contracts and come better prepared and informed. LDCs do not seek to be better informed and tend to surrender responsibility to suppliers. Many LDCs seem to believe that total supplier loyalty leads to better terms. But this is not the case.

Djeflat also refers to a UNCTAD report that identified LDC companies as lacking information and commercial know-how required

to assess the merits of what they needed. Many such companies showed limited aptitude for technology packaging, selection and preparatory work. They were also poorly informed on alternative sources, suppliers and markets. Many also turned to finance-technology packages because they lacked capital. This left suppliers with a lot of decision-making powers. Kenya's sugar industry has been built on such finance-technology packages. The power alcohol programme looked at in Chapter 4 was based on a similar structure created by middlemen with neither the technology nor the money, just an awareness of local weaknesses.

Technology-finance packages are worsened by the bureaucracies and uninformed decision-making practices. Ventura (17:p.170) considers technologies in enclaves as untransferred and contributing less than their potential. He argues for better information on technologies, the veracity of suppliers, their operation record, overall business profile, strengths and weaknesses, their competitors, and intimate knowledge about their negotiators. Only then, he argues, can an intelligent decision be made. Enos and Park (15) add the need to closely monitor the implementation phase and enforce contracts.

Learning and mastering core technology means developing the capability to "manage" it. This means adapting and diversifying into similar or related industrial endeavours and moving toward independent product and systems development (20:p.47). It is the conceptual confusion that has contributed to what Vo (20:p.48)

refers to as industry transfer, instead of technology transfer.

By Industry transfer Vo means only the transfer of productive capacity and a little operational know-how, but not the technology itself. It is the case when MNCs export "turnkey factories" or firms undertake surveys or exploration, help build production or processing facilities, and provide equipment and technical devices. Some training of local personnel may take place, but not enough to ensure capability transfer. Diffusion does not take place because the countries do not have, or have, but do not enforce, national domestication policies regarding the acquisition of basic engineering capability (20:p.48).

Ventura (17:p.172) and Paez-Urdaneta (10:p.187) both point to the competitive nature of international negotiations which requires adequate information management. By being uninformed and surrendering to suppliers LDCs make themselves very transparent and vulnerable. It is differential information between contracting parties in technology transfers that prevents efficient contracts from being made. Market failure from differential information leads to adverse selection which characterises LDC terms of international trade especially in their negotiations for technology transfer. This is worsened by the information encapsulated in a technology package being implicit and giving the seller undue advantage in bargaining. An information based approach to technology transfer study adds a new dimension to the activity.

2.2.0 The Information Science Framework

Machlup's (14) study of information in economic activity identified a tendency among decision makers to accommodate themselves to information deficiency whenever the cost of additional information proved prohibitive by adapting to the uncertainty. He thus argued for an alternative conceptual framework for pursuing pareto optimality under a new science. Defining science as knowledge acquired by sustained effort, Machlup (2:p.217)) saw the new science as advancing the frontiers of information, knowledge, ignorance, error, expectations, risk, and uncertainty (2:p.225), and, therefore, advancing autonomous decision making.

It will be argued here that information science is one such discipline. It offers the framework for such a science because it is inter- and multi-disciplinary. Its lack of a homogenous set of tacit and shared paradigms (21:p.13) permits the importation ideas from other disciplines in a manner difficult in structured disciplines.

The term information science was first used in 1958, but it was not until the 1980s that a comprehensive work on knowledge, systems of information and communications was attempted (14:p.6).
Information features in nearly 40 fields. These fields are a product of bunching of new "meta-disciplines, inter-disciplines and sub-disciplines" (14:p.9). Most social sciences have sub-

sectors addressing information and knowledge in society. For example, anthropology and politics enquire into knowledge and information, while social psychology has its own literature on information and knowledge. Amidst this are many direct specialities that consider information a major constituent including computer and information science, library and information science, information theory, general systems theory, linguistics, semiotics, and several others (14:p.10).

Information science is a framework covering the role of information and knowledge in economies and in international relationships. Its adaptability to new concepts and paradigms is made possible by the pervasive nature of information and its integral part in all human endeavours as a resource, commodity and "constitutive force in society" (6:p.8).

Machlup (2:p.231) traces a trend in which the rules of science are shifting in favour of flexibility. The trend is marked by a reduced emphasises on methodological perfectionism in favour of pragmatism, sensitivity to reality and applicability. This has been discussed in Chapter 1. However, this research trend makes flexibility of information science a bonus in the study of development and technology transfers - fields long dominated by structured social sciences. According to Cronin and Davenport (21) and Arrow (22) the information science approach to abstract analysis permits research that is cumulative, generalizable, and

readily enriched by importations from other disciplines (20:p.353). The trend towards flexibility and generalisations is, in any case, blurring traditional distinctions between disciplines. Whereas this "leakage" (25:p.11) unsettles professional convictions, it is also a source of innovation (14:p.363).

Information science follows a social science research tradition that partakes and uses theories from education, linguistics, economics and sociology (14:p.396) and transcends old parameters (6:p.6). This is the framework applied in this study of technology transfer, industrialisation and development in Kenya. The exercise is founded on institutional cumulative memory and learning in pursuit of change.

Stonier (23:p.42) blames the failure of many disciplines to cope with the full implications of the information and electronics revolution to a lack of "interdisciplinary and future-oriented" framework of education and training. As seen in Chapter 1, the Pacific rim countries are trying to address the matter. However, Wersig and Windel (24:p.11) consider information science as already at the interface between technical disciplines like cybernetics, computer science, telecommunications, technology-based subjects like mass communications, social sciences like sociology, and humanities like psychology.

I addition to the blurring of traditional disciplines referred to

by Machlup (14:p.363), Horton (25:p.11) also sees technology causing a "leakage" between practices of information scientists, librarians, data analysts, management scientists, and records managers, making it difficult for individual experts to work in isolation.

The term information management was first used in the US in the 1980s (26:p.13). It covers subjects ranging from library services to database management. Best (26:p.13) defined it as overseeing the integration of computer-based and paper-based, internally or externally derived information, from a range of sources, to support the functions of business or government. It is the economic, efficient and effective co-ordination of production, control, storage, retrieval and dissemination of information from external and internal sources, in order to improve the performance of an organisation. As Hills (27:p.3) points out, information management is critical because it constitutes the fundamental processes of government, business, industry and education. What is more organisations are organisms held together by the means of acquiring, using, storing and transmitting information (27:p.4). Ventura (17:p.165) adds that the essence of effective management revolves around acquisition and protection of sound and vital information and knowledge. This is what makes it possible to staff, direct, coordinate, report and budget, or, in other words to manage.

Information resource management is a concept that links managerial effectiveness and information acquisition and use. It represents a synthesis of a range of ideas based on the premise that effective decision-making and strategic thinking cannot be divorced from information consideration. It covers the organisational/institutional capability to translate diagnostic results into specific and knowledgeable information needs.

However, technological convergence has sometimes led to confusion in literature between information and information technologies (ITs) (28:p.68). Information is the intellectual product of human cognitive processing and IT the technical ability to process and transfer the information product. It is erroneous to equate technology in the hardware sense with information and the use of information. As referred to earlier, this error permits the adoption of IT equipment as a representation and measure of how well an economy is handling information while the reality is different (6:p.5).

As indicated before, information technologies are a broad set of technologies ranging from cabinets, shelves, telephones, telexes, computers and the added value derivatives. The current level of electronic based ITs are, thus, at the end of a long chain of structural and organisational changes in developed economies going back to the industrial revolution. IT-led productivity is a result of many attendant and contributory factors that have created an

appropriate organisational or institutional environment in which the new technologies have beneficially grafted. Good information management first requires the creation of an appropriate and transparent institutional environment for such organic grafting. This institutional attitude is the "societary informatisation" (10:p.178).

Machlup (14:p.642) also refers to information as "intelligence". This is echoed by Dedijer and Jequier (29). They define intelligence as "the ability of institutions to acquire new information and knowledge, make judgements, adapt to environment, develop new concepts and new strategies, and act in a rational and effective way" (29:p.xi). Ventura (17:p.164) refers to social intelligence as "the organised ability of a country, or any of its components, to adapt to the rapidly changing world by combining acquisition and use of information with planned operations and activities". Ventura identifies social intelligence as the information that fuels action by providing confidence for the use of otherwise static information. He suggests this is the information that directs and shifts society out of acquiescence and complacency with existing levels of knowledge and thus causes change.

When information is used to plan and advance the future and to cope with the attendant uncertainties, it is referred to as strategic information. This study will focus on national institutional

management of the kind of information that stirs activity and moulds future response to future events. Informed strategic decisions are however founded on quality information about prevailing circumstances. This accords with the perception of social intelligence as the "organisational capacity of a nation, a government, a corporation or any social organism, to acquire and use information in order to probe its environment, identify new threats and challenges, and respond in a creative way to new circumstances" (29:p.27). This macro-level intelligence at national level is what we refer to here as strategic national information management. The responsibility for strategic national information management is bestowed on national institutions.

Information, knowledge and intelligence are a system determining the ability of an individual, a firm, a country or a government to acquire new information and knowledge, make judgements, adapt to environment, develop new concepts and strategies, and act in a rational and effective way on the basis of the information acquired (29:p.13). In technology transfer, it involves monitoring technological developments in developed countries, evaluating their probable impact and, making optimal decisions on the basis of information that is often incomplete, and dealing with future events (29:p.4). Such strategic decisions require an independent world technology reconnaissance capability (IWTRC). IWTRC supports autonomous decision-making and also technology transfer negotiations.

2.2.1 National Information Management and Capacity Development

Enhanced national social intelligence contributes to learning and creative capacities. Fransman and King (20:p.65) refer to such capacities as ITLC (independent indigenous technology learning capacity) and ITCC (indigenous technology creation capacity). An informationally efficient infrastructure encompasses organisational, attitudinal, confidence, motivation and state of mind aspects. The hard-ware infrastructure is not, in itself, sufficient.

Governments play an important role in information management in LDCs. Katz (3:p.113) is of the opinion that any study dealing with information, technologies, and diffusion must, of necessity, address government policy because political interventions have an impact on the early stages of the development of information infrastructures. Central government is an ideal locus where information, documentation and mass communication policy is formulated and implemented (29:p.85). But government bureaucracies manage information on the basis of history and routinised procedures rather than logic. Therefore, transparent procedures for institutional flows of information within national information policy framework could improve fluidity of information transmission. However, the ways in which decision-makers receive information from subordinates and colleagues depends on patterns of authority and networks of mutual trust within the institution

or society. This may need reviewing and attitude changes. The policy emphasis needs to be on enhancing transparency and addressing information attitudes.

From an informational perspective, secrecy is man-made uncertainty. It is, however, a form of government operation and states need a degree of secrecy. But accommodating transparency is important. Katz (3:p.137) has argued that future LDC development will have to be information driven. The reason he gives is that the public information sector in LDCs is overmanned but under-used. What is lacking are the innovative ways to mobilise it. It is thus important to view political structures as information processing entities that generate demand for both information workers and technologies and conceive development plans from that view.

Therefore, a policy challenge for LDCs is not so much to increase physical infrastructure or size of the knowledge industry, but to create a favourable information environment and attitudes for effective operations (29:P.227). Although the efficiency and speed with which information is transferred is conditioned by quality and density of the infrastructures, related actions or decisions are influenced by intangible elements like attitudes to secrecy, social values, personal relationships, cultural traditions and structures of authority. The value of information depends not only on "its intrinsic importance, its relevance or its veracity, but also on its timeliness" (29:p.231). The policy framework needs to address

trade-off between timeliness, reliability and secrecy and the means for effecting societal, institutional and attitude changes.

Most LDCs accept the modern scientific enterprise as central to enhancing national capabilities. But new science continues to be initiated in the West. However, knowledge creation dependency need not be an obstacle to technology transfers as the Pacific region testifies. The lesson here, according to Vo (20:p.45) is "that careful planning and correct policies lead to real and beneficial technology transfers". Real technology transfer is however a multistage, multilevel process of "domestication, indigenisation, and diffusion" (20:p.45). Djeflat (18:p.15) sees the stages as covering costs, adaption by local operatives, internal capacity inventory, technology choice, importation, channel selection, and negotiations. Enos and Park (15) add monitoring of implementation and enforcing of contracts and deadlines. During this process, core technology needs to be mastered and the capability to adapt the foreign technology to suit local demand and manufacturing conditions developed.

However, importing of technological goods does not lead to technology transfer. Imported technological components only transfer if they fit into the local design framework (31:p.14). Freeman (32:p.119) explains the Japanese success as founded on a great use of indigenous scientific and technical resources to assimilate and improve on the imported techniques. Effective local

capability inventory is therefore important to technology transfer. Ventura (17:p.165) points out that in most LDCs indigenous technologies are left to peasants and ignored despite their forming the backbone of the economies. The technologies are thus not improved on and most resources go to importations of foreign technologies. The result is imports of obsolete, irrelevant technologies that cannot be absorbed, maintained or improved on to suit local conditions (17:p.169).

The failure to take stock of, and use, indigenous resources and traditional strengths has been costly. Ventura therefore advocates intimate knowledge of traditional modes of production as an integral part of technology transfer management. Rahman (31:p.12) also reiterates that much effort and research is needed to study technologies rooted in, and derived from, local natural resource base. Ventura (17:p.169) warns that readily available foreign technology packages should not be summarily embraced at the expense of long-term nurturing of national indigenous capacities. National capability inventory and management, it is argued, needs to be at the core of capacity development.

2.2.2 Indigenous Technological Capability and Information Management

Domesticating technology is difficult without the indigenisation of human and nonhuman resources. Vo (20:p.47) considers the most important element of transfer in industrial technology as the

accumulation of experience concerning project implementation and manufacturing operation at the middle- and top-management levels down to the maintenance level. Thus crucial to indigenisation is training and participation of local personnel and the institutional mechanisms for storing, processing, using and diffusing experience and learning.

The technical know-how and operational experience acquired in any one field should spread to other industrial endeavours if the recipient country is to build indigenous capability. A first step towards generating indigenous technology is the ability to diversify into related fields using experience learned from the area in which foreign technology was imported. However, transplantation requires a favourable environment characterised by a transparent institutionalised "technological culture" in which communication of specific as well as general industrial knowledge plays an important role. "Real technology transfer assumes that each enterprise for which foreign technology is sought contributes to the diffusion process" (20:p.47). Only countries like those in the Pacific rim appear to have made this significant progress in "real" technology transfer. Many achieved the ability to transplant some industrial technology. In such circumstances, Vo considers the transfers as "apparent", not real. He also considers technologies transferred through MNCs as proving unable to accommodate and address local peculiarities and applications (20:p.47). Information management helps address collective

accumulations of learning and experience.

Technology transfer failures have been blamed on the modality of the transfer, the environment in the recipient countries and a lack of government leadership. Despite being a channel for firm-specific technological transfers, foreign direct investment, for instance, does not contribute to indigenous capacity. The lack of an adequate infrastructure of indigenous firms able to use the technologies in the forms transferred prevents diffusion into the wider economy. This vacuum requires alternative government instituted mechanisms to unpackage and diffuse the technologies. This responsibility is bestowed on specific institutions.

Vo (20:p.49) considers licensing arrangements a better channel for product technology transfers. However, the experiences of the Pacific region indicate that this alone is inadequate. Correct public policies are vital. Korea's transfer success is, for example, attributed to an excellent physical and financial infrastructure, adequate supply of skilled labour, and a pool of high-powered technical and scientific knowledge founded on one of the oldest systems of mass education in the world. Korea is the second largest commercial shipbuilder in the world, is in the forefront in construction business, and runs one of the most successful motor industries outside Japan, USA and Europe. This is built on programmes conceived after 1960. Like many others, Vo (20:p.50) considers native ingenuity and public policies as

having much to do with this success.

Erdilek (33:p.50) points to technology not being priced or traded through arm's-length transactions in inter-firm markets as contributing to the transfer problem. Market imperfections mean much technology transfer is intra-firm and internalized within MNCs. MNCs bypass external markets in order to maximize net benefits through mechanisms that include transfer pricing. MNC systems have thus led to controversies about the way transfers take place, the nature of technologies transmitted and the impact of such transfers on the technological capabilities of LDCs. But the debate on appropriateness, as discussed earlier, drew attention away from the contribution of information asymmetry to the perpetual vulnerability of LDCs in technology imports.

LDCs have to negotiate with MNCs in technology matters. Ventura (17) describes the MNCs as "brimming with a solid stock of specific technological knowledge woven into high level social intelligence fabrics". The corporations often know more about the needs and weaknesses of their LDC customers than the customers know about themselves. Both Ventura (17) and Djeflat (18) point to LDC teams characterised by superficial understanding of technological market alternatives and a lack of preparation that forces them to depend on the information technology suppliers are willing to divulge.

Technology transfer depends on the proactive stance of the host

country. References to Japanese technology transfer policy documents of the 1950s indicate this. These did not refer to "technology transfer to Japan" but to "Japan's acquisition of technology". Such a posture needs to be cultivated in the technology transfer management institutions.

Technology transfer does not take place if the recipient country is not ready. The readiness is conditioned on its ability to build economic and physical infrastructure, improve and consolidate human resources, and establish sound institutions. The role of public policy is important in bringing that about as well as in conceiving imaginative solutions. Technology transfer will depend on enhanced national social intelligence. The required strategic national information management is, however, the responsibility of national institutions. How they generate and assimilate new information and knowledge is important.

2.2.3 Knowledge Dependency and Technology Management

Technology is a product of a society's knowledge creation endeavours. Every human grouping constructs its map of physical reality, tests it against reality, and adapts it accordingly (34:p.1). After a map is legitimized it becomes congealed in the rituals of society. Annerstedt (35:p.129) concluded that organised knowledge is the key factor of a society. He sees society as resting upon a continuous flow of diversified information. This furthers production and change by creating new knowledge. A

society therefore needs new knowledge to better understand and control changes in its natural and social environments. Ventura (17:p.166) sees development factors as dependent on creative use of knowledge while Arrow (22:p.609) defines invention as "the production of knowledge".

Change, creativity, growth and development is a product of new knowledge caused by breakthroughs in attempts at new views of reality (34:p.2). This process of growth and evolution of knowledge should be self-perpetuating, self-sustaining, and endogenous. However, But the source for new stimuli or insights to changes in reality need not be endogenous. International reality demands that stimuli be sourced from global scanning and research. Research is, in the words of Annerstedt (35:p.139), "any creative systematic activity undertaken to increase the stock of knowledge, and the use of the knowledge to device new applications".

Goonatilake (34:p.69,70) states that science, defined by Machlup (2:p.217) as knowledge actively acquired by society, is influenced by political and economic considerations. This is especially true of industrial science and science-based technologies. Economic imperatives dictate funding of particular scientific and technological developments by both state and private sector organisations. Therefore, the social structure of modern science is dependent upon the social, economic and political organisation

of society and is sensitive to changes in this environment.

As a result, knowledge creation in LDCs faces a problem from dependent infrastructures. It is social dynamics that influence what is produced and the areas of knowledge investigated. Because research is founded on previous findings, relativism is strong (34:p.72). New knowledge is established by reference to an audience and what it accepts. It defines acceptable areas of concern, sets standards, and decides legitimate uses for the new knowledge (34:p.74). The audience is therefore central to scientific claims.

Under this framework, sub-Saharan Africa is disadvantaged in knowledge creation endeavours. At the start of the "lost decade" in 1980, for example, Africa's share of global research and development reached 0.3 per cent (35:p.138). This means that the region has look outside for mainstay knowledge out of necessity. But this has inherent risks.

It is the specialised research community that filters research output and decides what is to be recognised as "facts" within a body of scientific knowledge. "Scientific truth" is, therefore, partially, arrived at by social processes such as acceptable credentials, keeping the right peer set, selecting acceptable problems and methodology, and communicating results through accepted media (34:p.74-5). Theories are therefore formulated,

accepted and abandoned by social fashion. Influencing this fashion is important. But this depends on where the influential parties reside.

Normally, knowledge develops through relatively autonomous ways while remaining porous to external influences and selecting from external cultural realms ideas which, in a broad sense, fit its internal social criteria. Cross-cultural borrowings are made both across contemporary cultural boundaries and across time boundaries. Knowledge and information are thus a process constantly interacting with the socio-economic environments and moving in response to changes in that environment. The additional or new knowledge that accrues to an existing body of social knowledge should consist of those elements that respond adequately to the internal and external social environment. Therefore when a particular community or sub-culture is beset by uncertainty, it should tend towards greater receptivity to new ideas (34:p.81).

However, as indicated, the knowledge creation and technological frontier facing LDCs is not a normal one. Contact with European science has led to much of what now constitutes universal legitimate scientific problems and methodologies being defined by the prevailing intellectual climate in Europe and USA. As a result, most formal knowledge creation activity in LDCs is removed from the immediate needs of society. With research mainly supported by the public sector, the situation is self-perpetuating.

Much of what is traditional and indigenous and affecting the majority of the people receives no resources to update and develop it. This has contributed to ignorance of traditional knowledge creation processes and technologies. Ventura (17:p.167) points to this divorce of information and knowledge generation from national priority problems as contributing to the weaknesses in national technological infrastructures. At the point of technology negotiations, the subsequent ignorance of local realities leaves negotiators without relevant information on how to commercialise technology in a manner that relates to their special interests. This also contributes to the credibility problem encountered by information professionals attempting to juxtapose information in mainstream development knowledge management (8). The information and knowledge they collect and manage remains alien to immediate national needs and the formal sector to which the profession addresses its arguments is acculturised to purchasing, rather than searching for and formulating, solutions. The sector does not need competitive information to run such an arrangement.

Goonatilake (34:p.87) has concluded that European created knowledge has stultified non-European countries that have absorbed it. It had the effect of delegitimizing large amounts of valid, relevant knowledge from these countries. However, monoculture in knowledge creation eliminates potential new avenues that may address terrain

peculiarities. In Africa European knowledge discouraged the evolution of a culture built on a search for consensus in new knowledge creation. The culture of importing blueprint solutions has stunted thinking in national institutions and spawned imitations and mimicry.

The system of legitimizing new knowledge by reference to exotic practices peripheralised all forms of indigenous scientific, cultural and knowledge creating endeavours and skills. It is now difficult to distinguish between creativity and aping in mainstream national culture. The mimicry in national institutions is supported by opaque regulations that penalise creativity, as discussed in Chapter 1. These institutions cannot be held to account because their performance standards are externally conceived and cannot be evaluated locally. Resource limitations also contribute to universities and research institutes producing knowledge of little relevance to the immediate environment.

Scientific and technological "xenophilia" dominates LDC markets making direct intra-LDC trade difficult. Entry into another LDC market needs to be arbitrated through Western legitimizing systems undermining any advantages due to propinquity. Success in Western markets is required to establish credibility within LDCs. This was the case with the Malaysian national car, the Proton. Its successful entry in the UK market was instrumental in its acceptance by, for example, African markets. This pattern of

knowledge creation, adoption and acceptance has serious implications for technology importation, the process of creativity and intra-LDC trade policies and concepts.

The practices pursued by knowledge creating institutions in LDCs undermine objectivity and creativity. Ventura (17:p.169) suggests "goal specificity" in review procedures as a remedy. Knowledge creation, according to Ventura, needs clear plans and set goals. He refers to a "plethora of private and public concerns" from LDCs searching for technologies with no clear perspective on wider national direction, responsibilities, or other parties involved. The tendency to import immediate packaged knowledge and solutions has led to low search culture among institutions and a preference for proprietary information despite high costs and alternative public sources. What is more, such costly information is not diffused once acquired.

2.2.4 Redefining Technology and the Transfer Process

Goonatilake (34:p.120) considers technology as the intermediary in man's interaction with the environment and a tool in coping with nature. This points to the absence of "universal technologies" as such. What exists are specific solutions for specific socio-economic pressures and requiring adaptation whenever transplanted. He (34:p.121) sees technology as an assemblage, under given social circumstances, of available knowledge on the properties of matter and the particular skills used, including search skills. Search

includes research and development and reconnaissance and intelligence.

Particular technologies are outcomes of configurations of particular socio-economic forces at particular times. As a result, technologies carry "scars of the socio-economic systems that gave it birth, and, the scars of the particular history". Goonatilake concludes that technology is the historical flow of socio-economic systems congealed in the form of hard-ware and materials or software and information. Particular technologies carry scars of conflicts, compromises and social solutions reached by society. Therefore, technology reflects class relations of a society, the nature of its economic system, its patterns of conflicts and conflict management. To be effectively transferred, these components of the technological package need to be unpackaged, identified and understood before they can be grafted organically on to a different economic system, history and terrain.

It is the successful evolution of Western technology into mass production and its ability to provide an unending supply of quality goods and services that makes it attractive to countries outside its immediate socioeconomic context. These perceptions also undermine the competitiveness of craft technologies as viable alternatives. But, in adopting Western technology it should not be perceived as universal. This awareness makes possible the adoption of dynamic and long-term structural policies that

purposively prepare the new terrain for an organic rather than illusory transplantation (20:p.50).

Fransman and King (30:p.13) also consider machinery as embodying the prevailing dominant social relations from the country in which it is produced. This explains why Western technologies are capital-intensive, create divisions between mental and manual skills, and increasingly deskills manual and craft skills that, incidentally, predominate in LDCs. European society favours mental skills. Drucker (1:p.9) points to the "deindustrializing of the labour force". But this trend spells problems for countries whose cultural ideals and indigenous forms of production are not inclined this way but who are nonetheless interested in Western technology because of its ability to deliver. The solution lies in seeking locally conceived and devised compromises as part of technology transfer management.

The Pacific rim's (and Japan's) success in incorporating and reproducing Western technology involved important changes and compromises in social relations. But most important was the identification and recognition of the social and organisational problem. This reality continues to elude Kenya's planners.

Morishima's (1981) "Why Has Japan 'Succeeded'? Western Technology and the Japanese Ethos" points to the Japanese slogan "Wakon Yosai" ("Japanese spirit with Western ability") as a statement of

intention to address the problem. The intention was to organically "graft" Western technology to the strengths in Japanese society and culture (30:p.13). Enos and Park (15) point out that the South Koreans recognised that the Japanese had already worked on this problem. They therefore built on the Japanese package to suit their conditions. But in Africa, as indicated in Chapter 1, little intellectual effort has been expended in devising an organic social compromise as part of technology transfer management.

Fransman (30:p.60) advocates the need to immerse knowledge creation in local traditions. This would make it possible to immerse the imported technology into people's creative talents and thus endogenise the management of change in a society. Without such well considered measures, the result of technology transfer efforts will remain technology enclaves. With LDC science alienated, endogenising creativity requires institutional changes.

This is illustrated by a report (36:p.21) on a Kenyan scientist forced to sell a coffee invention based on ultra-violet light to a European manufacturer, who, after developing it sold the equipment to Kenya's coffee industry. The inventor found no supportive local institutions. For instance, until December 1989 (37), Kenya's Patents Registration Act (38) allotted the responsibility for managing Kenya's inventions to the United Kingdom. Only patents registered at the British Patent Office,

under UK Patent Law were recognised in Kenya. The Director of Kenya Industrial Research Development Institute (KIRDI) has complained of inventors suffering from lack of incentives, motivations, funds and confidence in indigenously produced technology (6:p.21).

It is therefore important that means are devised to engineer an association with imported technology. This can be on a technical or organisational basis. What is important is that the society is able to identify with goals generated by the technology. Formulating this compromise requires good knowledge on the social and productive goals of the technology and the production mores of the importing society. This is the lesson from "Wakon Yosai". The alternative is marginalising the pool of a nation's unique indigenous skills, dynamism and other innate abilities that have evolved through centuries of interacting with the local environment. This is the trap confronting much of sub-Saharan Africa.

In Africa, environmental spontaneity is hampered by a lack of a natural and organic identification with the imported technology. Clark and Juma (39:p.16) propose that unless the behaviour of the relevant institutions is specifically "built into" an appropriate theory or metaphor, it has little chance of informing policy, since policies operate through, and by means of these institutions. Relevant national institutions should work to project technological

change as a social process and cause circumstances that allow for direct integration of information flows into the analysis of economic change. This is the epistemological framework which looks at learning process as dependent on current inputs and existing state of knowledge. This conceptualisation of the learning process fits within the framework of information science and perception of technology transfers as information flows whose effectiveness depends on accumulations of knowledge and skills at institutional, societal and national levels.

2.2.5 Information, Institutions, and Technology Transfer

Djeflat's (18:p.165) two decade technology transfer studies have concluded that LDCs need to pay more attention on the:

- kind of technology they intend to import;
- type of contract to be used;
- channel for import; and
- nature of negotiations to take place.

All these steps depend on information and knowledge on alternative sources, markets, competitors and substitutes. Only then can equitable and meaningful negotiations take place.

O'Brien and Helleiner (12:p.1) point to the disadvantaged position of LDC negotiators and market participants caused by their information poverty. They see specialised use of information and knowledge and the deployment of new technological capacity to convey it as determining future economic competition between

nations. It is therefore important that a country be able to integrate or synthesise pieces of information into coherent units for pursuing its development goals. But this requires an effective infrastructure consisting of organisations able to use the information gathered and define correct policies.

Djeflat's (18:p.165) remedy is the introduction of mechanisms to strengthen the bargaining power of LDCs. For this he recommends that LDCs:

- be properly informed about suppliers and products;
- unpackage the technologies as much as possible;
- avoid supplier financing; and,
- use group buying.

He argues that LDCs need to allocate more time and effort to preparations for technology transfer negotiations. Djeflat advocates intensive and wide use of search capacity in order for the team to be better informed.

From their study of South Korea, Enos and Park (15:p.231) report on active and intense government participation in all technology negotiations before 1979. The objective of the government was to ensure that Korean parties were as informed as possible. The government did this by making its import regulations clear. The Korean technology transfer landscape was therefore well documented and transparent. Industrial targets were precise and the government adhered to its targets. Korea therefore bears testimony

to transparency, goal specificity and documentation in planning and implementation. The Korean government also insisted on exhaustive surveys of alternative techniques, technologies, suppliers, markets and the possible combinations.

In the Korean technology transfer landscape supplier profiles are emphasised and updated. Also important was that all potential suppliers were sought and negotiated with whether they responded to tenders or not. This requires good international reconnaissance. Korea emphasises implementation time schedules, full capacity utilisation and holds technology suppliers accountable for undertakings made during negotiations including support in entry to export markets. Technology diffusion was ensured through conferences and trade exhibitions.

What Enos and Park underline is a proactive government, institutions with a sense of purpose and organisations that learn between projects. This is shown by improved time schedules, higher utility of installed capacity, and lower implementation costs between related projects over time. Institutional learning and memory was evident. This was inspired by the public sector and infused into private sector operations. This is what Clark and Juma (39:p.16) have referred to as an adequate institutional machinery at government level.

There are advantages in a purposive informational approach to

industry management through an appropriate information policy approach. For example, the Japanese motor industry frequently operates co-operation ventures of various firms from different sectors through temporary industrial groups called "Keiretsu". This is a loose, temporary, confederation of independent, or semi-independent companies, maintained through effective flows of information. The "keiretsu" depends more on mutual co-operation, and information cross-flows among members of the system, than on levels of financial and legal integration that underpin Western corporations. This gives keiretsu the advantages of large organisations but without the accompanying disadvantages of size, buffer-stocks, vertical integrations, and multiple sourcing of components which could lead to unwieldy dedicated equipment, lack of flexibility and co-ordination and impersonal operations (39:p.168).

A country like Kenya, with its dearth of dedicated finance, supplier, distributor and franchise-holder organisations in any defined industry could learn from such innovative arrangements. But innovation depends on the inclination of national institutions.

Clark and Juma (39:p.176) see technological innovations as involving constant improvements on the adaptive parameters of national systems. This is achieved by matching previously unmatched environmental features or adapting to new changes.

However, innovations can disrupt market niche and make existing equipment, skills, materials, components, management culture and organisational capabilities obsolete. They can bring about the attendant disruptions that accompany change and development described in Chapter 1.

Therefore, Clark and Juma (39:p.180) suggest that the analysis of patterns of information flow make it possible to predict dimensions of shift. The same argument is put forth by Hirshleifer and Riley (7:p.209) who based their logic on economic activity as a process shaped by decisions. As a result flows of information constitute pre-conditions for subsequent events including economic growth. Both Clark and Juma and Riley and Hirshleifer therefore see patterns of information flow as having predictive value of possible trends. They thus suggest that a study of an economy's information flow and infrastructure patterns contributes to predicting the direction the economy may take.

With the environment in constant shift, technological entrepreneurship becomes complex and full of uncertainty. However, the levels of uncertainty for young industries can be reduced if national environment enabling institutions work towards enhancing operational terrain transparency. In a transparent terrain patterns of information flow are more discernible and comprehensible.

Changes in information flows take place because the process of economic exchange is an act of learning inhered with a search for alternative ways of doing things. The changes create economic reorganisations, and lead to generation of new forms of knowledge. This is what makes change a process of social learning as argued in Chapter 1. Social learning depends on appropriate information flows which effect the change.

Institutional organisations, inherent in a policy framework, are intended to ensure that information and knowledge is generated and disseminated in a less random way. Institutions thus help to channel and manage change. New technologies therefore require new institutional arrangements and, by inference, new information configurations. It is the new information channels that constitute the reorganisation. Reorganisations are needed because old institutions are repositories of old codes, regulations, channels and practices. Not only is their capacities to handle information requirements for new technologies limited, but they could inhibit development of new technologies because of inappropriate channels, practices and vested interests (39:p.182).

Vested interests can become powerful obstacles to change and the learning process when aired via political constituencies. But keeping abreast with rapid technological change requires a preparedness for rapid reorganisation. This has implication for

public policy and how to cope with vested interests. A science-based approach to managing vested interest lies in wider exposure to the reality that without change, little self-sustaining technological capability can take place. This means economic decline.

Japan and Korea have demonstrated that research leadership and total mastery of knowledge generation is not crucial to international competitiveness. What is important is ability to utilise available technical information in the process of economic evolution and niche making. This ability depends on the capacity of countries to establish institutions which can facilitate the process. An important goal for such institutions includes ability to smooth the flow of information and resources pertaining to planned tasks. This requires flexibility, extensive diversity, experimentation and relative autonomy in decision making (39:p.182).

Japan put most of its early efforts in enhancing its independent technology learning capacity (ITLC) rather than the more expensive, risky and prestigious independent technology creating capacity (ITCC), for well over 100 years (40:p.67). For example, between 1950 and 1978, Japan bought the bulk of new knowledge produced in the West between 1940 and 1978. They paid out US$9 billion in royalties, outright purchases and returns on equity participation. Although the figure rises when put in constant 1978 dollars, it is

no where near the US$60 billion spent on R & D by the US alone in the single year of 1978 - a figure that reached US$63 billion in 1980 (33:p.52). The Fifth Generation Computer Project, however, signals Japan's shift in strategy from ITLC to ITCC (40:p.80). Korea's car industry has also been built on narrow niche realisation. Only recently has this successful sector instituted measures to grasp the wider technological capability chain.

2.3.0 Conclusions

Technology transfer to LDCs and their capacity to adapt imported technologies has not been understood because relevant studies have emphasised firm- and plant-level transfers and innovations and ignored broader issues of institutional organisation which play a significant role in the performance of imported technologies. The failure to stress institutional focus is attributed to epistemological weaknesses. As a result:

- most studies use neoclassical tools for analysis and conventional indicators to judge performance of various imported technologies;
- neoclassical leanings make it difficult to recognise the role of institutional organisations;
- it is difficult to assess the impact of institutional organisation on any given technology development without undertaking comparative work on a similar technology;
- institutional divergence is as manifest within countries as it is within countries.

Most of the information and knowledge acquired at project level does not always contribute to overall policy learning because of institutional vacuum. Political will is needed because it is in the political arena that broad evolutionary paths are defined. The capacity to accumulate and mobilise knowledge and experience depends on how well existing institutions can retain and reproduce experiences. This is what constitutes policy learning (39:p.184).

In most LDCs policy learning is hampered by vested interests and limited flows of newly generated information, indicated by the limited learning that has followed the failure of industrial projects initiated in the 1960s and 1970s. Terrain opacity does not serve the learning process. But this lack of transparency is also due to the operational nature of bureaucracies as the case studies will show.

Economic systems based on diversity and relative independence can only be held together through extensive information exchange. However, the structures of government institutions restrict the flow of information. Where research is government controlled, the problem is deepened. But necessary institutional arrangements of policy need to be specific to a country, technology, and historical period. The evolution of institutional configurations depends on available information, technical requirements, financial needs and private interests. These are country specific.

Under conventional government practise, activities of the bureaucratic machinery are distributed in a fixed manner as official duties or functions. Tasks which fall outside jurisdictional domain are ignored, explained away, or passed to other officials. But, as situations tend towards complexity, new requirements for technological development cannot be met without destabilising the bureaucratic system. Since the bureaucratic machinery is meant to create and remain in a stable state, and government officials are empowered to maintain it thus, contradictions follow.

The bureaucratic rationality accorded government departments is based on the view that all information and knowledge required to implement projects is available and all resources can be mobilised by government fiat. But projects, especially of technological nature in LDCs, encounter problems related to the fact that every step in the implementation process is unpredictable and non-routine and requires new pieces of information sometimes unavailable locally. Thus bureaucracies fail in project implementations. The manner in which government officials handle information limits or obstructs wider capacity to learn from emerging situations and stultifies the contribution of the learning process to adaptive change.

This style of managing information is based on office documents or

files made inaccessible by government secrecy regulations. The information is seldom synthesised or analysed for useful lessons. Secrecy prevents the information being subjected to recombination or selection for purposes of institutional or technological learning and innovation.

Transparency is vital in the make-up of a technology learning model for an LDC. It enables recombination, synthesis, selection and objective reviews of activities for learning and accumulation of experience. But it conflicts with secretive bureaucratic procedures. The tendency towards secrecy, or lack of transparency, is a major contributory obstacle towards efficient use of experience and available information in LDCs. It also obstructs accumulation of learning and improvement of societal knowledge and undermines negotiating capabilities.

Evidence from recent technology transfer studies indicate the need for flexible, adaptive and semi-autonomous institutions that assume uncertainty and therefore emphasise learning and the flow of information through dynamic networks. But such policies for long-run economic change are only possible where institutional and political contexts permit adaptive change.

In a world of increasing complexity, integration and competition political institutions and staff need to take on a corresponding character or else the nation is overtaken by those that do. The

growing disparities between LDCs bears testimony to this. A high profile civil service able to direct technology transfers and flexible and sensitive to international changes underlines the Pacific rim success. The economic cost of accommodating institutions that act otherwise is brought out by the case studies here. In any event, the already overmanned bureaucracies can only be made productive by such mobilisation. The option of redundancies could carry a bigger political price for countries with small and diminishing formal employment sectors.

It is therefore information handling capability of environment enabling institutions that supports operations of economic agents in Kenya that this study sets out to evaluate. This combination of existing information technologies and workers is considered the national development capital upon which effective technology transfer can be constructed. The evaluation of this capital requires a multi-disciplinary framework. The framework to be adopted here is that of the discipline of information science.

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3.0.0. METHODOLOGICAL CONSIDERATION

3.1.0 Introduction

Information sector studies from both developed and developing countries identify growth. The reasons for the growth are, according to Katz (1), however, different.

In developed countries the growth is located in the private sector and marks advanced re-organisation in production methods. In LDCs, this growth is in the public sector and takes place despite deteriorating productivity. It is caused by political intervention to absorb the output of a training system out of step with national productivity needs. It represents an overmanned and unproductive bureaucracy.

This has implications for information sector study design for a developing country like Kenya. Information sector studies can focus on:

- information technologies;
- information workforce;
- information industries; or,
- social information flows (1) or societary informatisation (2).

As argued in Chapter 2, information technology studies in LDCs often end up as census of equipment and vendors. A similar study has been undertaken in Kenya (3). Some LDCs have adopted

information policies intended to boost information technology industries as was the case with India and Brazil. Studies of the information workforce in LDCs, as indicated (1) point to an unproductive bureaucracy.

Kenya has no information technology industry. But, as with most LDCs, no study with a societary informatisation focus has been undertaken here. A study with this inclination in Latin America, by Salinas (4), identified structural and cultural constraints that undermined improved information management despite additional technologies or improved international information access. Salinas study emphasises societary informatisation above high technology acquisitions. This study adopts the societary informatisation approach.

3.1.1 Focus of Research

The data collection for this research took place in two stages. The first stage was a survey of Kenya's information infrastructure between December 1987 and June 1988 (5). It covered 30 educational and research bodies, the national postal and telecommunications authority, and professional, industrial and commercial associations. The survey found differing levels of information facility availability and use, reflected in resources dedicated to information support. It also confirmed that there was little use of competitive information in decision making in Kenya. This has been identified in other LDCs by Paez-Urdaneta (2) and Sturges and

Neill (6).

In order to study of Kenya's societary informatisation, a case study approach focused on project implementation was chosen. This was intended to identify institutional coordination in common tasks. It was considered important to look at how the relevant institutions galvanise resources and synchronise their operations.

The industrial sector was identified as the best location for the case project because industrialisation is identified as an area of national development priority, that, according to Matthews (7) and Bennel (8), has had a poor performance record. The problem has been identified as related to technology transfer. This national problem was to be subjected to a new information-based diagnosis.

As argued in Chapter 2 (p.83), there is no accepted holistic technology transfer model. But, Enos and Park (9) refer to the "rogue theory" of "learning-by-doing" as offering a framework for analyzing capability building. This study is based on the premise that capability building at institutional and national level requires information diffusing mechanisms. The study therefore looks at corporate or institutional skills, learning, memory and experience accumulation and transferring mechanisms among Kenya's technology management institutions.

This study acknowledges government secrecy in project management and assesses whether the **Official Secrets Act** advances or obstructs efficient project implementation.

3.1.2 The Assumptions

This study assumes that understanding the information economy is important in defining the national development path in the context of global trends. The trends need to be taken account of in development and technology studies.

The study also assumes that Kenya, for the foreseeable future, will need to import most of its technology requirements because of its dependent knowledge creation position. Improving capability for negotiations is therefore important.

Recent studies, such as those of the Pacific rim have emphasised the importance of government and public sector enabling institutions in managing technology transfer. Katz (1) also underlines improved use of public sector bureaucracies (the information workforce in LDCs) as crucial to future development. This study focuses on the navigational role of government institutions, how they improve terrain transparency and how they facilitate national learning.

This study acknowledges that declared policies are not always in step with practice. Therefore, documentation procedures are looked

at as aids to transparency in policy and practice. It is also assumed that documentation aids reviews and supports goal specification and accountability.

In this study, the term environment enabling institutions covers public sector institutions as well as professional and business associations. These institutions constitute fora in which ideas are conceived and formulated into policies and agenda for project definition and implementation. The focus is therefore on the institutions as economic navigators, and less as economic agents.

In order to evaluate institutional goal specificity, experience transfer and learning, a time lapse was required in the study. Enos and Park (9) refer to performance improvements in Korean institutions between projects over time. This was reflected in improved completion times, higher installed capacity utilisation, and falling costs between similar and related projects over time as discussed in Chapter 2 (p.119-120). These occurrences testify to institutional learning, experience transfer, goal specificity and objective review procedures. In order to take on board the element of time, this study adopts two cases and looks at events between 1973 and 1990.

The cases were also selected on the basis of their importance and ability to galvanise and marshall wide national political and institutional attention and resources. The cases are looked at

against the reality of other countries, organisations and forces in the international arena involved in similar projects. This makes it an inventory of Kenya's information processing capital.

3.2.0 Objectives of the Study

The objective of this study is to test the hypothesis that efficient national identification, selection and management of strategic competitive information aids effective technology transfer and development. The study assesses the use of strategic national information management in unpackaging imported technology and aligning its components to indigenous technological and cultural capabilities, talents and traits.

This is an information policy study. It looks at how information policy supports the mechanisms for keeping long-term national development agenda in focus despite pressures of short-term considerations. This supports policy learning through institutional memory and learning, and objective, transparent and documented evaluation procedures. Such institutional ability is considered vital to identification, selection, negotiation for and transfer of suitable technologies.

It is the intention of this study to look at measures that define inter- and intra-institutional and sectoral synchronisation in project implementation. Also of interest is extant procedures and guidelines for accessing local and external expertise, evaluating

alternative technologies and suppliers, environmental appraisal, accessing strategic and competitive information on technologies, suppliers, financiers, and donor markets. Interest is also paid to guidelines for purchasing and paying for identified technologies, and procedures and practices in monitoring technology transfer processes and enforcing contracts and commitments.

The mechanisms for institutional acquisition, retention and generation of expertise and enhanced learning and memory capacities receives special attention as it helps evaluate the role and capability of enabling institutions in advancing the national learning curve in the handling and absorption of alien technologies.

3.2.1 Research Methodology

This is a novel research theme significant in its holistic and multidisciplinary approach to the information-based concepts of development, technology acquisition and organic transfer. It breaks new ground on information management systems in Kenya and is broad-based because no previous groundwork has been carried out.

After the preliminary survey (5), the societary informatisation research took place between December 1989 and April 1990. 32 organisations were visited and 56 people interviewed.

The questions were intended to identify operational search culture. Questions were asked about alternatives and options for suppliers, techniques and markets and the related operational requirements for using the alternatives. It was also intended to identify whether informed decision-making, institutional capability inventory, proceduralising and documenting of experience, monitoring project implementation and enforcing schedules, contracts and reviews was considered as operational requirement among the institutions in particular, and in the wider Kenyan terrain in general.

The study used open-ended questions administered as personal interviews. A guideline of the interview structure was forwarded in advance to the interviewees. The questions were intended to capture and address operational practice for comparison with the official role of the institutions. The latter was checked against official documents. The emphasis on practice in relation to the cases was intended to reduce restatements of official position. As many institutions as possible with an interest in the cases were included.

The aim was to visit as many institutions and interview as many individuals as possible within the time frame. This was to give adequate data and permit the understanding of all actions, and reduce, as much as possible, the gaps in the description of events, surrounding the cases. The evidence would then be used to confront and test the hypothesis. Therefore the diversity of information

sources was deliberate and meant to capture the actual reality.

Published reports and studies of the events were looked at, including newspapers, journals, government reports and studies (internal and published) and seminar papers referring to the projects. As many past and present participants in the cases were interviewed as well as those considered to have related and, or, relevant expertise in the fields. In some instances, opinion was sought outside the usual informed circles in order to comprehend the perceptions of the wider public affected by the cases.

The strategy was to capture and assess the posture of Kenya's institutions in coping with global changes while navigating these specific local developments. Attention was paid to procedures and requirements for documenting, and disseminating and institutionalising information, knowledge and experiences acquired and used in project planning, appraisal, and implementation of national programmes. The flexibility and ability of institutions to anticipate, accommodate and cope with the unexpected was looked at.

3.2.2 Criteria for Case Selection

With aim of being as comprehensive as possible within the time frame of the study, the institutions and organisations selected were those with an influence on technology selection and adoption in Kenya either as environment enablers or as technology

participants. The need to understand the capabilities and role of these institutions determined case selection.

The cases were required to:

- need the dedication of several enabling institutions for their success. Participation of the institutions would thus expose their operational guidelines and practices;
- be within the core area of identified national interest although government equity participation was not necessary (both, however, had government equity);
- be of a scale and importance to require inter- and intra-departmental, sectoral and ministerial co-ordination and synchronisation. This permitted the assessment of information flow patterns. Scale also indicated level of importance to the country;
- be of the kind to need foreign partnership. This permitted a review of search procedures and negotiation preparations and capabilities;
- be of a sophistication as to need use of the best national research, skill and entrepreneurial capabilities. This made it possible to evaluate national capability inventory procedures;
- be able to call upon use of institutional memory building and benefit from transfer of experiences from other projects or sectors. This was in recognition that participants in projects move on and the information management issue is whether capabilities remained in institutions as foci for social macro learning or departed with individuals. The cases were thus

intended to exercise the memory of institutions that had participated in previous high profile projects.

The study recognised the inadequacies of the theory of the firm discussed in Chapter 2. The focus was therefore on the national landscape or terrain. The focus on the terrain was intended to identify the process of change on the continuous national technology landscape and thus capture evidence of learning.

Capability building in Kenya's technology transfer terrain was to be evaluated on the basis of procedures and practices founded on:
- credible and documented planning and evaluation;
- search and survey of alternatives;
- preparations and transacting of negotiations;
- scheduling and implementation; and
- diffusing of capability between industries, sectors and projects over time.

The cases chosen were the National Power Alcohol Programme and the National Car Project.

3.2.3 The Power Alcohol Programme

The power alcohol programme first featured in 1973 and partially came on stream in 1985. Possibilities for its expansion are kept alive by Kenya's continued vulnerable dependence on the volatile Middle-East for its commercial energy supply. In addition, the

sugar industry on which the programme was founded is in serious need of vertical integration to improve operational margins.

This programme presents an opportunity to test institutional memory, learning and project management practices. Because power alcohol remains in the national research agenda as the local alternative source of liquid fuel, it is an ideal case for studying policy learning in national institutions between 1973 and 1990.

3.2.4 The National Car Project

The National Car Project was new and on-going, and thus presented logistical problems. Officially launched in 1984, the Project was in official documentation until 1986/87 when it was classified. The project however offered a surrogate means for assessing national machinery capability. For logistical reasons, it was often necessary to refer to "machinery capability" in written research correspondence. The project would then be referred to only in the course of the interview.

In the course of the fieldwork, however, the prototypes were unveiled and, for a period, the project was openly discussed. But even while still classified, many interviewees remained willing to discuss it. The reservations in other quarters, however, underlined the different interpretations of secrecy requirements of government in Kenya.

As an on-going exercise, this project raised some conceptual questions of research legitimacy. However, this was an information management study looking at the management of information in pursuit of laid objectives. It was treated accordingly.

A comparative international framework was included as an evaluative bench-mark of Kenya's ability to tap into global stocks of information, knowledge and experiences. This made it possible to put the learning dimension in the context of global realities of the motor industry. But most important, the case was an opportunity to evaluate synchronisation efforts, consensus seeking among institutions, clarity of objectives, and experience transfer between projects. It offered the latest opportunity to assess policy learning in Kenya.

3.3.0 Limitations of the Research

A limiting factor was time. Despite two visits to Kenya in the course of three years, getting fieldwork logistics in motion took a lot of time. As a result not all identified institutions could be visited with the reciprocal danger that the picture may not be total.

Another limitation was related to funds. The mechanics for getting funding approval created unexpected demands and led to reduction of time spent at some institutions and the number of interviews conducted.

Although terrain opacity was within research parameters, it sometimes made it difficult to conclusively assess institutional learning processes. Aided by the Officials Secrets Act, it was sometimes difficult to distinguish between secrecy, lack of capability, lack of information, or ignorance.

Finally, this is an empirical study of societary informatisation in Kenyan institutions. It reflects an information culture moulded by the players in Kenya's technology sector. It is a sector dominated by multinational and state corporations, marketing boards, and political institutions that nurture certain traits. It may not be similar in an environment with a different combination of factors. Some information cultures, as argued in Chapter 2, are country specific.

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4.0.0 NATIONAL POWER ALCOHOL PROGRAMME

4.1.0 Introduction

Kenya's power alcohol programme was built on the sugar industry. Power alcohol was intended to reduce the level of imported petroleum on which Kenya depended for over 85 per cent of its commercial energy needs. Events in the Middle-East after 1973 pointed to the need for a local and reliable alternative source of liquid motive fuel. Ethanol or power alcohol (also known as ethyl alcohol) fitted this bracket.

The post-1973 crisis disrupted the OPEC (Organisation of Petroleum Exporting Countries) price consensus and gave ethanol price competitiveness making it part of the 1970s movement for renewal energy sources.

Ethanol has a lower energy content than both petrol and diesel but burns at a higher thermal efficiency and has a higher octane rating. It can be used neat and Brazil has over 2.2 million cars running on neat hydrous ethanol (Appendix 1). Cars using neat hydrous ethanol are fitted with small petrol tanks and the engine exhaust is placed in contact with the intake manifold to pre-heat intake air without additional fuel cost.

Ethanol can also be blended with petrol to boost octane ratings and to replace lead which has carcinogenic effects. For blending

purposes anhydrous ethanol is used (Appendix 1). The mixture of ethanol and petrol, referred to here as **gasohol**, reduces carbon monoxide emission of motor vehicles by as much as 20 cent (1:p.21) while reducing the amount of petrol consumed.

Although based on renewable biological materials, ethanol production requires technological intervention. Kenya's power alcohol programme is, therefore, an exercise in technology transfer management. This chapter looks at how Kenya's national institutions managed the technology selection and implementation of the power alcohol programme. The institutional arrangements underpinning the sugar industry are addressed to see how they affected the programme and if there were lessons transferred. The system of institutional documentation and transfer of learning and experience between projects is addressed and how this informed debate, discussions and decisions concerning the new programme.

4.1.1 The Ethanol Technology Process

Ethanol processing technology developed in the beverage, rather than the energy sector, and involves fermenting simple sugars. The **batch fermentation system** takes 36-48 hours, has an efficiency of between 90-95 per cent, and requires little skilled labour. The **cascade process** uses tanks connected in a series which saves down-time and reduces chances of infection. In the more advanced **continuous fermentation process**, both substrate and yeast are re-cycled reducing down-time and increasing volumetric efficiency.

But the system employs more capital equipment and needs skilled labour. Later developments include **computer-aided-fermentation** (CAF).

Simple sugars can be obtained directly or indirectly from a wide range of biological materials available in Kenya (Table 1). Starch can also be converted to simple sugars and fermented to produce ethanol. As a result, some developed countries, like Finland, use grains as "feedstock", or input, in ethnol production. Such countries find starch based plants attractive because it absorbs their surplus grain. But starch based plants do not generate adequate independent energy and sophisticated technology is required to address this problem.

Feedstock options include cellulosic material like agricultural residue or municipal solid waste (2:p.111). Wastes however require complex and costly modifications to existing technological systems to achieve economic conversion to fermentable sugars.

Feedstock access and pricing is critical and should be based on national availability and relative cost. Kenya adopted molasses, a by-product of the sugar industry, as feedstock. But cane juice, tubers, grains and cassava (Table 1) could also have been used (3:p.64). Molasses has a wide range of other end-uses including animal feed, human consumption and technical applications. In Kenya, molasses constitutes about 3 per cent of cane tonnage milled

(4). When subjected to fermentation, molasses yields a range of potentially marketable products. But to get the right niche requires careful consideration.

TABLE 1

Kenya's Alternative Sources of Ethanol Feedstock

Crop	Yield (tonne/ha/yr)	Ethanol	
		Litres/tonne	Litres/ha/yr
Sugar cane	50-90	70-90	3,500-8,000
Sweet sorghum	45-80	60-80	1,750-5,300
Wheat	1.5-2.1	340	510-714
Barley	1.2-2.1	250	300-625
Rice	2.5	430	1,075-2,150
Maize	1.7-5.4	360	600-1,944
Sorghum	1.0-3.7	350	350-1,295
Irish potatoes	10-25	110	1,110-2,750
Cassava	10-65	170	1,700-11,050
Sweet potatoes	8-50	167	1,336-8,350
Grapes	10-25	130	1,300-8,000
Molasses	-	**245**	-

SOURCE: Adapted from National Academy of Sciences, Washington - Quoted in Clark, N and Juma, C. (34:p.120).

Molasses also creates pollution problems either on its own or as slop or **stillage** in ethanol processing. Early surveys of molasses use in Kenya focused on pollution threats. Every litre of ethanol produced discharges about 20 litres of stillage. This makes

pollution an important consideration in the choice of technology for ethanol programmes.

Some technologies emphasise this. For example, the Swedish engineering company, **Alfa-Laval**, has designed a process that utilises concentrated feedstock. Instead of leaving 15-20 litres of stillage, this **Biostil Process** releases between 0.8-4 litres. The Biostil process is marketed by **AC Biotechnics**, a subsidiary of both Alfa-Laval and another Swedish company, **Cardo**.

Kenya's choice of molasses as feedstock prevented examination of alternatives. But this was occasioned by project proposals coming from organisations with interest in the sugar industry and was not the result of a considered decision by government institutions.

4.1.2 Kenya's Power Alcohol Scene

Juma (5:p.49) estimated that between 1973 and 1976, Kenya's sugar mills (Table 2) produced about 60,000 tonnes of molasses a year. About 70 per cent of this was exported, seven per cent used in local industry, 10-19 per cent used as cattle feed, and two per cent dumped in the cane fields causing pollution. Unsteady export prices and rising transport costs continually made dumping a popular alternative.

TABLE 2

SUGAR MILLS IN JANUARY 1988

FACTORY	YEAR ESTABLISHED	OWNERSHIP	MANAGEMENT	CAPACITY (Tonnes/Year)
Miwani	1922	Hindocha Family (Kenyan/Indian)	Hindocha Family	60,000 (1,200 tcd)
Ramisi	1927	Madhvani Group International(Indian)	Madhvani Group	30,000 (1,530 tcd)
EASI-Muhoroni	1966	Kenya Government	Mehta Group * International(India)	60,000 (1,800tcd)
Chemelil	1967	Kenya Government	Booker McConnel** (British)	55,000 (2,235tcd)
Mumias	1973	Kenya Government	Booker McConnel (British)	180,000 (7,000 tcd)
Nzoia	1978	Kenya Government	Kenya Government***	60,000 (2,000 tcd)
Sony	1979	Kenya Government	Kenya Government****	60,000 (2,000 tcd)
WKS*****		Bhiku Patel	Patel Family	4,000

SOURCE: Various.

KEY

tcd - tonnes of cane crushed per day

* Under Kenyan Government management since June, 1990 when the Mehta Group contract expired and was unexpectedly not renewed.

** Under local management since 1985.

*** Currently under local management although facing intractable problems.

**** Sony was under Mehta management until 1985. It was temporarily under local management but is currently under Booker Tate until 1992.

***** West Kenya Sugar Company - privately owned and currently the only operational OPS (Open Pan Sulphitation) in Kenya.

Ethanol production was seen as a means to enhance value-added, regularise the profit flow of sugar mills, meet some of the country's liquid energy needs, and reduce environmental risks. A government initiated study by Tate and Lyle of UK in 1975 was followed in 1977 by three proposals for ethanol projects. Two of these, submitted by Mehta Group and Madhvani Group, were approved.

Mehta and Madhvani were companies owned by two Asian families originally based in Uganda and with a long-standing presence in the East African sugar industry (owning Lugazi and Kakira factories respectively). They moved to Kenya following the expulsion and appropriation of Asian businesses by the Idi Amin government. For the companies, this was an opportunity to build expertise in downstream operations of the sugar industry. The third proposal was by a Kenyan entrepreneur, Dr Oluoch Okeyo (6), a pharmacist by training. The three applications had no ethanol experience.

At the time of submitting the proposals, the Mehta group had equity interest in, and managed, East African Sugar Industry (**EASI**) in Muhoroni and South Nyanza Sugar Company (**Sony**) (Table 2). The Madhvani Group owned and managed Ramisi Sugar factory at the coast. In the end, only the Mehta project, **Agro-Chemical and Food Corporation (ACFC)**, came on stream. ACFC is annexed to EASI although it maintains a separate management hierarchy. Until recently, EASI was managed by Mehta Group International while ACFC is managed by International Investments Corporation (IIC), a subsidiary of Mehta International (7).

ACFC attributes its origins to the oil crisis of 1973 which saw the crude oil bill reach US$58 per barrel. It has an installed capacity of 60,000 litres per day of power alcohol and 4.0 tons per day of baker's yeast. The corporation was created in 1979, construction work began in **February 1981** and commercial production in **June 1982.**

The government has 56 per cent equity in ACFC through two parastatals, Agricultural Development Corporation (ADC) and the Industrial and Commercial Development Corporation (ICDC), each holding 28 per cent. The Bermuda registered **International Investment Corporation (IIC)** holds 34 per cent and has the management contract. The balance, 10 per cent is held by **Verengite Edelstahlwerke GmbH (VEW)** of Austria (1:p.21), an Austrian state-controlled engineering firm.

Over 80 per cent of the foreign exchange funding for ACFC came from **Girozentrale und Bank der Osterreichschen Sparkassen Aktiengesellscaft** of Vienna, Austria. The technology was supplied by another Austrian organisation **Vogelbusch**, controlled by VEW. Vogelbusch remain technical consultants for ACFC (8).

On record, the government has approved four other ethanol plants in Busia, Mumias, Sony and Riana (8). Both Busia and Riana are approved for 60,000 litres a day. But the ground work for ethanol introduction was conducted by **Kenya Chemical and Food Corporation (KCFC)**, the Madhvani Group's proposed company. KCFC is a joint venture between the government (with 51 per cent equity), **Advait International S.A** of Luxembourg (15 per cent), and **Chemfood Investments Corporation S.A. (CIC)** of Switzerland (34 per cent). The stillborn project was initially financed by **Union Bank S.A** of Zurich, Switzerland and **Process Engineering Company A. G (PEC),** also of Switzerland, who supplied the technology. **Eximcorp, S. A** of Panama were the project managers.

Work on KCFC stopped in August 1982 amidst controversy and cost overruns. By this time construction was 80 per cent complete. There has been no work done on the other four approved projects. Kenya's national power alcohol programme is therefore confined to ACFC. Up till 1985, capacity utilisation at ACFC was below 30 per cent. This created liquidity problems and debts from which the company has yet to recover (8). ACFC first marketed power alcohol

for 10 per cent blending with premium petrol in **May 1983** following problems with the oil companies who control liquid fuel acquisition, processing and distribution networks. Sales improved after 1985 and capacity utilisation now averages 75 per cent (1:p.20). But this was only attained following a government directive extending blending to premium and regular petrol sold around Nairobi from **November 1985.**

Although gasohol in Nairobi was intended as a pilot programme preceding nation-wide coverage, the rest of the country has not come on stream. But Nairobi area accounts for 70 per cent of Kenya's liquid fuel consumption (8).

ACFC is designed to use molasses, exclusively, as feedstock. It consumes 70,000 tonnes of molasses and produces around 16.5 million litres of alcohol per annum. Although designed for 18 million litres, a design fault limits output (8). This is the output that determines Kenya's national ethanol requirements.

Political statements hint at possibilities of extending gasohol use in the country (2:p.137) and plans to annex more ethanol units to existing sugar mills. What is more, KCFC, as a corporation, has not been formally wound up. Possibilities of its revival still feature in the political arena (9:p.5). However, active government attention to power alcohol as an alternative strategic energy ceased in 1985 when references to it disappeared from official

documents of government planning. The steadying of oil prices since 1983 has altered official calculations on national liquid fuel needs.

There is ongoing national research interest. **KIRDI** (**Kenya Industrial Research Development Institute**) records refer to a **"power alcohol project"**, since 1985, in collaboration with IPT Brazil (10,11,12). A plant prototype was completed in 1986 but has yet to be fabricated and put up. The prototype is intended to be small and within the means of Kenyan enterprises and resources. Final fabrication is to involve UNDP, UNIDO and an export agency in the United Kingdom. This indicates bilateral and multilateral international agency interest.

4.1.3 Choice of Molasses as Feedstock

As indicated, other feedstock options available to Kenya were not explored because of private sector initiatives from firms with associations in the sugar industry. They presented proposal packages complete with feasibility studies which, at the time, appeared to save the government the cost of carrying out its own studies. The proposals assumed, and the government approved, that the sugar industry was the most suitable foundation for the national power alcohol programme despite the unstable nature of the industry. No government documentation on the approval process refers to the instability of the sugar industry (6).

The instability is caused by global over-production. Over 80 per cent of sugar is traded through "special arrangements" unrelated to production costs or demand (13). This makes the industry vulnerable to political events.

Basing ethanol production on sugar cane processing mills does however have technical advantages. Sugar cane furnishes its own processing energy from its fibrous residue, **bagasse**, used as fuel in steam boilers (3:p.129). One tonne of wet **bagasse** is equivalent to a barrel of crude oil in energy output (14:p.42). Under normal conditions, therefore, modern cane factories employing vacuum boiling methods are self-sufficient in energy and produce surplus. Steam and electricity produced from excess bagasse can be fed to attached refineries and distilleries. Some cane mills deliver power to irrigation systems and national grids (14:p.42). The surplus energy makes it economic to annex ethanol units to sugar mills. Therefore, the choice of cane processing technology is important when ethanol production is under consideration.

The boiling process is the primary source of scale economies in sugar processing. Because the boiling point of water is lower under vacuum conditions, it was realised, in the mid-nineteenth century, that granular sugar yields could be increased if the boiling process could take place in a **semi-vacuum** spherical pan - referred to as the **vacuum pan** (**VP**). This reduced energy costs in the boiling process and offered an additional advantage over the

old method in which juice is boiled off in a series of open pans - the **open pan sulphitation (OPS)** (13:p.5).

A major difference between OPS and VP is in heat demand for juice boiling. The VP process is more energy efficient. It draws heat and power from a central steam raising plant. The centralisation results in an efficient utilisation of the energy in the bagasse. The relatively small size of the OPS furnaces, their simple construction and lack of a heat recovery system lowers efficiencies (15:p.28). The energy efficiency makes VP plants suitable for annexation of ethanol units.

But a case can still be made for OPS systems in Kenya within the context of an ethnol programme given the capital and foreign exchange intensity of VP mills. The flexibility of OPS mills allows them to economically produce a mix of either cane juice, sugar and liquid molasses, or sugar and solid molasses. Large scale VPs may be considerably efficient in processing cane to sugar, but managerial and distributional diseconomies associated with ensuring sufficient cane deliveries often offset such economies. What is more, the capital intensity of VP plants make the cost of suboptimal capacity utilisation particulary high (13:p.5). This cost has foreign exchange implications.

The introduction of OPS along VPs, and use of their partially processed products within a framework of independent ethanol units

and units annexed to VP mills could improve the overall performance of the sugar industry. In addition, the cost of OPS is within reach of local entrepreneurs and could open up the industry to wider private sector participation and competition. Presently, the large government presence conceals inefficiencies and other costs in the industry. The costs, carried into the ethanol programme, bar private sector entry.

4.1.4 Impact of Government Presence

Commercial sugar production started in Kenya in 1922 following the establishment of Miwani and Ramisi Mills (Table 2). Two privately owned OPS plants were established in 1974 and 1977 in Kabras and Yala but did not survive for long (13:p.15). The other OPS proposal, the **Opapo Project**, has faced approval delays because of government fears it may encroach on Sony cane supplies (4,6). Farmers contracted to Sony would, however, prefer an alternative outlet (4,6,16).

Kenya's sugar industry is dogged by factories operating below capacity and farmers facing liquidity problems. The result has been increased sugar imports (17). Government presence however prevents objective diagnosis of the problem. It has majority shares in the mills (Tables 2 and 3) although it contracts out the management of most plants.

TABLE 3

Sugar Milling Ownership Structure / Transition to 1990

Factory	Government Equity (%)	Management Agents
Miwani	Hindocha Group/Lonrho (1990)	
Sony	92	Mehta International/Booker Tate(1985)
EASI-Muhoroni	74	Mehta International/Local (1990)
Mumias	71	Booker McConnel (Tate)
Chemelil	100	Booker McConnel/Local (1985)
Nzoia	97	Technisucre/Local (1985)

State entry into the industry was funded by finance-technology packages from several countries. Thus, Mumias was funded and supplied by British technology, Chemelil is German, Nzoia French, Sony Indian (with German turbines), and Muhoroni Dutch (Table 2).

This has made it difficult to pursue a defined industrial technology acquisition policy or seek economies of scale on parts and components purchases. But most important, it has undermined technological learning and transfer of related "core" technological experience between projects. The fact that technology-financing agreements have also involved management contracts has led to the unintended exposure to different work cultures. Without institutionalised measures to synthesise the systems, the results have led to confusing and conflicting management practices, particularly when management agents are changed, as happened at Sony in 1985 and recently at Muhoroni (4,6,7).

The government also determines the price of cane by direct and indirect controls, intervenes in sugar marketing, determines prices, and authorises sugar imports. Sugar schemes are established by government fiat (18:p.14) and government makes the finance-technology selection decisions (18:p.16). It appoints the boards of directors of the mills who determine the industrial policy and awards the management contracts for running the mills. This has led to departmental conflicts in central government being reflected in the industry over, for example, appointment of management agencies. Such conflicts have undermined moves towards common policy to advance national capability in one of the longest established industries in Kenya. These weaknesses were reflected in the implementation of the ethanol programme.

Government presence in milling and distribution has shifted the burden and costs of bureaucratic inefficiencies in the industry on to the farmers. Proposals that mills sell directly to wholesalers have been opposed by interests in distribution business. As a result, despite being the third highest revenue generating industry in the country after tea and coffee, cane farmers face liquidity problems to a degree unknown in other cash-crop enterprises in Kenya. In addition, discussions of the industry attract the participation and interest of middlemen like sugar transporters and wholesalers to an extent that has not helped inform the industry. This confusion was transferred to discussions on power alcohol.

The mills make losses (13:p.18) but government association allows them to conceal this by depreciating capital at levels below replacement and to accumulate excise tax backlogs. Even older mills operate below capacity, indicating little "learning by doing" in the industry. What is more, despite time lapse, Kenya has yet to independently plan, design, build and commission a mill without a large foreign presence and direction. As late as 1979, Sony was designed and implemented by Mehta Group together with Lonker, an Indian firm (4). National capability in this industry is yet to be tested. This tendency to preclude local expertise was transferred to the implementation of ethanol projects.

TABLE 4

A COMPARISON OF AVERAGE ANNUAL GROSS MARGINS PER HECTARE OF SUNFLOWER, TEA, SUGAR CANE, MAIZE INTERPLANTED WITH BEANS BY REGION (KENYA SHILLINGS)

Crop	Nzoia	Mumias	Chemelil	Muhoroni	Miwani	Sony
Sunflower	947	947	947	947	947	947
Tea	55,089	55,089	55,089	55,089	55,089	55,089
Maize & Beans	3,910	3,910	3,910	3,910	3,910	3,910
Cane*(Z-C)	4,769	4,376	4,462	4,386	1,807	981

SOURCE: Adopted from Odada, J E O et. al (18:p.60)

* In relation to the mill, the supply areas are designated as Zones A, B, C, and D depending on distance from the mill. Margins fall with distance from the mill. The figures used here are for Zone C.

The culture of government fiat means that the establishment of this industry in Western Kenya is not entirely determined by ecological, economic or market suitability. Cane farming is not the most profitable enterprise for the region (Table 4). But government policies do not permit alternatives. Cash crop participation is based on regions. It was, therefore, regionalism that led to the ethanol programme being located in Western Kenya to supply Nairobi, 400 kilometres away in central Kenya. This has cost and efficiency implications.

4.1.4 The Cost of Regionalism

Cane competes for limited land, labour and financial resources with alternative crops, including tea and coffee, that suit the ecology of the sugar belt (Table 4). Some of these are considered "high earning crops" in official government categorisation (19:p.65).

Kenya's regionally-based agricultural divisions are rooted in colonial history. The foreign exchange earning cash crops were intended for the privileged settler community and national communication patterns, urban centres and industries were designed and planned to serve them. Settler agriculture received monopoly advantages in national marketing boards, regulatory institutions and production committees. These institutionalised advantages

remained in place after independence and have spurned new influential pressure groups that work against regional redistribution measures.

Therefore, it is government policy that underpins returns on certain agricultural commodities and their geographical distribution within the country. Some institutional changes are also circumscribed by restraints of international commodity trade. Therefore, export cash crops cannot be introduced in former "native reserves" because national quotas are already being met (20:p.97). Only a regional re-distribution of this quota would address the problem. But this is resisted by groups that have inherited the privileged commodities. Western Kenya cannot thus participate in "high earning" export agriculture because the national quota was distributed to other regions by the colonial regime (13:p.34).

Government ranking of cash crop production, on the basis of value per hectare, identifies the first seven "high value crops" as grown in Central Kenya and the last three in Western Kenya (19:p.65). This is reflected in the relatively high per capita incomes in Central Kenya and the poverty in Western regions. A government study in 1985 located much of Kenya's rural poverty in Western Kenya.

Kenya has, reportedly, the fifth most unequal income structure among LDCs (13:p.32) with the top 20 per cent receiving over 70 per

cent of total income (21:p.42). This structure is also regionally distributed. This regionalism underpins the sugar industry and affected the ethanol programme. Despite it being intended to supplement national liquid fuel needs, the programme was perceived in regional terms.

In Kenya, powerful groups influence resources distribution in an arrangement in which economic power is unequally and regionally distributed (22:p.6) on the basis of cash-crops grown. This is worsened by patron-client frameworks based on tribal loyalties that are an ingredient of African politics (23). This reality underpins distribution and location of industries. It is the responsibility of national institutions to formulate and present objective and consistent project evaluation methods that can be used to effect and support positive change.

Even a commodity industry with insufficient returns could be justified if it forms part of an industry chain creating opportunities. The sugar industry provides substantial employment. But evaluating the contribution of this industry requires a broader approach than the standard financial yardsticks applied by government departments and international finance agencies. This is particularly important when considering extensions to the industry as was the case with power alcohol.

The pre-packaged systems of project evaluation do not reflect

peculiar national realities. But leaving interpretations to the discretion of officials only serves to politicise and subjectivise the process. This cannot inform and improve decision-making processes.

It is important that evaluation methods and standards, including the social and political dimensions, are made explicit and transparent. When, for example, the power alcohol debate became public, no reference was made to regional compromises that underpin Kenya's foreign exchange earnings. Opportunity cost calculations identified the programme as unnecessary and costly. But the calculations did not consider imperfect domestic markets and other national peculiarities and the continuing uncertainties of the Middle-East from where Kenya gets its oil. Such calculations cannot, therefore, inform debate and decisions.

Kaplinsky (13:p.25), for instance, refers to **"social appropriateness"** calculations as required when evaluating a crop like cane and its spin-off sectors. For example, cane production is more labour intensive than many other Kenyan crops. It requires 1,764 person hours per hectare (hours/ha) as compared to, for example, 325 for maize. As such, a sugar policy that, in addition, emphasises OPS technology, would contribute significantly to employment generation. This would be important in a region, like Western Kenya, identified with long-term structural unemployment (13:p.25). But this needs to be specified, documented, transparent

and consistent if it is to inform decision making. It is inconsistency that, for instance, makes debate on OPS technology controversial even within a specialist unit like Kenya Sugar Authority (KSA) (6). This points to institutional weaknesses in informing national debate and decision-making, especially when objectivity could be clouded by partisan regional interests.

Inconsistency is evident in procedures for calculating the price structures for sugar. According to official practice, a "cost plus" approach, based on farmers' production costs, as estimated through KSA field surveys, and an added margin, is used to determine what is paid to farmers. The Ministry of Agriculture is also required to consider international and domestic demand and supply conditions in order to have the prices reflect economic efficiency and equity. The Ministry uses border import prices to determine the opportunity cost of utilising scarce national resources in sugar production.

However, border prices fluctuate and are unreliable. They are derived from a residual world market handling under 20 per cent of output and that is subject to dumping. With such distortions defining the world market, the Ministry's border prices cannot reflect efficient utilisation of resources and are misleading. The purpose of this exercise is thus questionable. But this routine is sustained, with varying degrees of strictness, depending on the officers responsible and the political alliances at play (6).

Discretion however politicises the exercise and makes it unpredictable.

The absence of specific guidelines also fuels inter- and intra-departmental conflicts caused by decisions and data that do not tally. This undermines the development of institutional expertise. Without informed, objective and consistent expert guidance, politics has gained a high profile in industrial decisions and sidelined the need for expert input. The practice of not seeking objective expert advice in decision making processes, common in the sugar industry, was transferred to the ethanol programme.

For example, sugar mills fall under different ministries. But whereas KSA is intended to advise the whole industry, operating regulations do not require that it be consulted. Nor is the advise it gives binding. This practice undermines the seriousness and accountability of technical expertise. The power alcohol projects were approved and implemented with minimum identifiable local expert input (4,6,8).

The government's ownership of mills has prevented a rigorous discussion of a consistent pricing formula for the industry. The price structures are therefore unrealistic and based on subjective compromises. The mills have, for example, prevented the institutioning of a pricing system that shares the benefits of bagasse and molasses with the farmers. In other countries,

farmers are paid on the basis of sugar yields, molasses and bagasse. In Kenya, payment is confined to tonnage.

The mills have argued that these are "by-products" for which paying would make milling unprofitable (20:p.98). But the mills sell molasses and use bagasse to generate energy. What is more, during discussion on molasses pricing for the ethanol programme, the mills contradicted this position and argued instead that "a product with effective demand could not be considered simply as a by-product" (8). Contradictions like this are permitted by procedures that are not consistent and transparent and by weaknesses in national institutional memory.

The "high yield" export crops do not face similar market imperfections. The more broadly determined, and relatively efficient, internationally bargained and deduced prices have, until the recent collapse of supporting institutions (24), ensured good returns for tea and coffee regions and intensified regional economic differences in Kenya.

As argued in Chapter 1, integration of regions in the development process is a prerequisite for general equalisation of incomes (22:p.1) and a means to attaining wider economic participation and hastening the pace of development. This has been illustrated by the Pacific rim nations. Retardation of some regions drags the rest of the economy behind by excluding their contributions from

the synergistic process of national wealth creation. Balanced regional development mitigates against large and disruptive migrations and staves off inter-regional frictions. In Africa, regional frictions are tribally-based and interfere with "nation-building" and other development efforts (22:p.1).

Poorly integrated economies generate economic forces that maintain, or aggravate, regional imbalances (22:p.4) and obstruct positive, flexible and participative development. These forces influence development plans and objectives and their existence colours debates on new projects like power alcohol.

One reason behind government investment in sugar, estimated at US$290 million (KShs.2.1 billion) between 1965 and 1980 (20:p.94), has to be seen as a need for compensatory regional distribution of incomes in a context in which Western Kenya already paid a high price for a historical accident (13:p.35). Despite conducive ecological conditions, the region suffers low incomes, widespread poverty, and levels of malnutrition only comparable to the arid eastern and northern parts of the country (13:p.35-40). Within current structures, only tea and coffee could conceivably compensate the region adequately (13:p.34). But this would disrupt existing production systems and derail national foreign exchange earnings.

Extending the sugar industry to ethanol production needed to be

supported by clear and specific statements on goals to be attained and structural weaknesses to be remedied or addressed by the new activities. The responsibility for defining this framework rested with national environment enabling institutions.

4.1.5 Institutional Learning

Kenya's development plan documents do not recognise and address the realities of regionalism. The country has sought to maintain traditional export markets and seek new ones with the same institutions and products. Juma (2:p.75) points to expectations of normalcy and upturns as shaping Kenya's political outlook and ruling ideology. He sees Kenya's institutions, as currently structured, as only able to manage minor reforms.

Government documents reflect this. One of the most thoughtful documents to date (25) was, for instance, in 1986, reiterating strategies for the next decade based on "the prime commodities" of coffee and tea. It saw the end of the coffee agreement in 1989 as an opportunity to expand quotas and increase sales to non-quota markets. As result, Kenya planned to expand national output of coffee and tea to meet this anticipated expanded global consumption and, implicitly, tied the introduction of coffee in Western Kenya to the upturn (25:p.66-7).

The document did not acknowledge rifts within the **International Coffee Organisation** (ICO) nor anticipate competition from old and

new producers. It pointed to Kenya's "stable political system, sound growing economy, central position in Eastern Africa, and its record of fiscal and monetary responsibility" as inevitable attractions to foreign investors (25:p.99). It did not note divestment trends from the continent to other parts of the world, protectionist and competitive activities in neighbouring countries, or the changing attitudes of international monetary agencies to what constitutes "fiscal responsibility". Instead, in 1989, the coffee agreement collapsed. The Paper confirmed a government awareness of Western Kenya's ecological suitability for coffee. The other assertions have not been reviewed in subsequent documentation. National institutions do not document learning process.

Institutional changes assume normalcy and continuing growth rates, despite shifts in reality. For example, informed calculation is required to address the VP/OPS technology choice in the country. The OPS technology avoids the social and environmental costs associated with VP mills (13:p.35) like mandatory nucleus estates and the economic devastations that follow mill closures.

For instance, the Mumias plant serves a radius of 21 square kilometres, over 20,000 small farmers, an acreage of over 36,000 hectares and a nucleus estate of 3,500 hectares. The closure of Mumias impacts a whole region. The moderate cost of OPS would open up the industry to wider indigenous participation, increase the

number of mills per target crushing capacity and reduce impact of such closures. But VP technology remains preferred on the basis of efficiency and output calculations that do not consider realistic scenario studies.

Recent rehabilitation programmes in the sugar industry indicate no change in direction. Rehabilitation started in 1982 and was intended to expand national sugar output. But at Sony, for instance, the exercise, scheduled to cost KShs.512 million, was designed to achieve the 1979 capacity of 2000 tcd (4). The technical opinion of staff at Sony is that this target crushing capacity is over-costed. However, the parameters and finance for this exercise were worked out without local technical input.

The rehabilitation arrangements at Sony were concluded between Booker-Tate management agents and the government appointed bureaucratic directors of Sony based in Nairobi (4). Booker-Tate negotiated and packaged the financing and contract with **Commonwealth Development Corporation**, **African Development Bank**, and **Agriculture International.** But these are agencies with which Booker-Tate enjoys frequent dealings as part of its global sugar operations (6). Any trade-offs negotiated are, therefore, likely to benefit Booker-Tate's worldwide operations rather than Kenya. In any case Booker Tate was at the time involved in negotiating the financing of the larger **Finchaa Valley** sugar project, which it had packaged for Ethiopia, with the same organisations. Such packages

preclude local experts and stunt local learning. Kenya's sugar rehabilitation programme was designed with minimal local technical input despite decades of national experience in the industry (6).

Rehabilitation should have afforded Kenya the opportunity to examine alternatives with the intention of deploying resources more efficiently per target crushing capacity. An option would have included, for instance, introducing more private OPS plants in the national equation (13:p.36). India, with over 8,000 OPS mills alongside VPs, has shown that recent technological development make OPS profitable and that competition in the industry enhances national performance (26:p.54).

Kaplinsky (13:p.36) sees increased OPS participation as opening up an innovative power alcohol programme arrangement in which juice extraction is carried out at several OPS mills and then shipped to VP mills in tankers. This would create technological diversity in the industry, maximise on the higher energy and technical efficiency of VP process, stimulate the economic and social benefits of small scale production, and remove the need for OPS to buy-in energy. It would allow for optional installation of independent or annexed ethanol plants that can take direct cane juice or molasses, or a combination of both, as feedstock from various OPS and VP mills. This would reduce the impact and cost of mill closures and improve capacity utilisation in the capital

intensive VPs. It would give the sugar industry the "flexible specialisation" (27) required to respond to international trends in ethanol/molasses/sugar and petroleum prices.

But such considerations require fine-tuned planning which is difficult to accomplish when decisions are discretionary and based on personalities, politics or finance-technology packages without deliberate measures to improve institutional learning and memory.

4.2.0 Implementation of the Programme

In **May 1973**, the Madhvani Group, in conjunction with some foreign organisations, submitted a molasses utilisation proposal to the government. It was accompanied by a feasibility study and details of how the project would be managed (28:p.97).

The first government initiated study was carried out by Tate and Lyle Technical Services in 1975. It surveyed alternative uses for molasses which, because of export problems, was becoming a potential environmental hazard. It reported a high sugar content in Kenyan molasses. A survey in 1981-1985 confirmed the sugar level at over 50 per cent. The mills report improvements that have brought the level to 42 per cent (8).

The early studies and proposals did not address national energy requirements. They were a search for domestic use of a by-product whose export prices were no longer feasible and whose dumping

created pollution. The Tate study was intended to inform government decision making. It linked molasses disposal with energy, but only as part and basis for a bigger organic chemical industry. Power alcohol was to be a first step in the development of a broader industry. Despite the global energy crisis at this time, the boom in coffee prices shielded Kenya's institutions from the reality.

In 1976, the Industrial Survey and Promotion Centre (ISPC) (29), a unit in the then Ministry of Commerce and Industry, submitted another report. But the ISPC study adopted the technical data from Tate and Lyle. It did not undertake separate studies or attempt to verify the technical assumptions of Madhvani and Tate and Lyle studies.

This weakened government competence in handling related technical negotiations because it lacked an independent institutional capacity to evaluate proposals (2:p.130). Matters were worsened by failure to prioritize aspects and phases of the intended "organic chemical industry" and the absence of a government master-plan against which to evaluate and influence proposals. All technically recoverable by-products of molasses were therefore assumed to be economically viable (29:p.4). This was not correct.

Without independent data or a picture of the industrial arrangement the country required, ISPC reported government intention to

"promote any viable proposal for industrial utilisation of molasses" (29:p.14). It also reported intentions to encourage a working relationship between sugar mills and oil companies which may be interested in participating in the manufacture of power alcohol (29:p.14). But this task was not allocated to any specific government department and no action was taken until after ACFC started production in 1983. However, such uninformed documented commitment exposed government departments to pressures and manipulation.

In **June 1977**, the government announced the approval, and committal of public funds, to a Madhvani re-submitted proposal. This re-submission had little modifications to it but no attempt was made to verify its data. The description of the project in the **joint venture agreement (JVA)**, signed with the government, refers to government undertaking "to arrange the supply to the company of adequate molasses at reasonable prices and all other local supplies necessary for the company's business" (28:p.97). The government guaranteed supplies of molasses (and "other local supplies") without ascertaining how much was to be required and what national output levels were. The Madhvani proposal also estimated molasses prices at KShs.160 per tonne at a time when exports were fetching KShs.246 per tonne. It is clear Madhvani expected subsidy, but this was not recognised in government records.

The government depended wholly on data submitted as integral parts

of project proposals. It adopted the data as its own for evaluating subsequent proposals. However, the expertise input accompanying the proposals were from interested foreign parties. The Madhvani study was undertaken in collaboration with **Process Engineering Company** (PEC) of Switzerland. But PEC hoped to co-finance and become technology suppliers to KCFC. The Mehta Group's study was undertaken by **Vogelbusch** who became technology suppliers to ACFC (30). The studies required impartial alternative verification mechanisms or data. At the minimum, national institutions needed a master-plan against which to evaluate proposals submitted. None existed (6,8).

Government negotiators did not attempt to establish the identity and reputation of the parties they were dealing with and assess whether they could deliver their part of the bargain. No corporate profile of the parties was compiled. This contravened guidelines of the Ministry of Industry (28:p.110). It also permitted Advait Holdings and International Investment Corporation (IIC) to pass for foreign experts in ethanol technology, which they were not.

In fact these were corporations owned by Kenyan resident with no experience in ethanol. Advait was, for instance, concurrently involved in a similar joint textile venture with the government, Kenya Fibre Corporation (KFC), in Nanyuki (31:p.11). Both KFC and KCFC later faced similar problems, were abandoned incomplete in 1982, and left the government to shoulder the liabilities.

IIC and Advait were incorporated in offshore tax havens of Bermuda and Luxembourg respectively, and intended to circumvent foreign exchange restrictions. They were used to sell joint venture proposals, guaranteed and funded by government, and generate revenue from sale of equipment and management fees while shielding themselves against liability and possible litigation. Approval of KCFC also breached government finance guidelines concerning participation in ventures that involve foreign parties. These ventures are required to be subjected to various scenario studies before approval (32:p.35). This was not done.

Gachuki and Coughlin (28) point to several instances in which national institutions have similarly disregarded guidelines. This indicates that guidelines are no guarantee to informed government decision-making. But guidelines help identify sources of failure and can aid remedial measures. For example, Odidi's (32) diagnosis of the inconsistencies exposed by KCFC traces faults to the recommendations of the **New Projects Committee** (NPC) which approved it.

The NPC was an **ad hoc** interministerial committee set up to evaluate proposals and negotiate with potential investors. The **1974-8 Development Plan** refers to NPC as the main "technical organ through which the government will administer legislation to regulate the establishment of industrial capacity" (19:p.285). But though intended to receive legal status, the NPC legislation, which would

have required firms to obtain government approval to increase manufacturing capacity, was never enacted.

The NPC remained an ad hoc committee with neither a clear mandate nor legislated responsibilities to enforce or implement. But the 1978-83 **Development Plan** still insisted that "projects not approved by NPC will not receive the **Approved Enterprises Status** under the **Foreign Investment Protection Act** and will not be entitled to any concessions or investment allowance" (28:p.94).

Until it was abolished in 1985, NPC had no legal status and had fulfilled none of the roles indicated. These events underline differences between policy and practice in institutional management. They also point to documentation as a poor barometer of intended government action. But, existence of guidelines supports the process of diagnosis and can aid remedial action.

The government sent representatives to a UNIDO workshop in Vienna in **March 1979** to improve institutional appreciation of this sector. But not all institutions were ignorant of the sector and the problem had more to do with poor co-ordination. For example, Ministry of Commerce and Industry records indicate awareness of India's attempts to produce fertilizer from molasses and the problems India encountered (2:p.131). But this could not have informed government policy because fertilizer remained an option in the "organic chemical industry" scheme. Such knowledge

compartmentalisation was exacerbated by government equity participation in projects. This pre-empted rigorous interministerial evaluation process because implementation became the responsibility of a particular department. Implementing departments are not required to seek expertise input from other units, nor, if they do, are they bound to take them.

Therefore, consultations between promoters of KCFC and the Ministry of Commerce and Industry culminated in government approval, and subsequent inclusion of the project in expenditure estimates, without exhaustion of laid down formalities. For example, the required detailed specific examination of the project by NPC prior to government approval and commitment did not occur. This would have required an expert report on the viability of the project, a report on national availability and utilisation of molasses, and a scenario study of possible impact of project collapse. Instead the process and decisions on KCFC were unusually hurried and by **16th July, 1977,** ministerial signature to the project had been finalised (32:p.36) (Table 5). Doubts and questions raised by other quarters or departments were ignored (2:p.160), including recommended amendments to the JVA from the Attorney General's Office.

Juma (2:p.131) has contrasted this with Rhodesia/Zimbabwe's approach to a similar programme. Here good communication between local business and government prevailed, sharpened by international trade sanctions following unilateral declaration of independence

(UDI) in 1965. Project managers emphasised international technological reconnaissance, knowledge of alternatives and well informed choices. Scenario studies included possible impact of sanctions on the project. This informed technology choice decisions. Zimbabwe emphasised national institutional learning and capability building and selected the technology that could be implemented locally and independently.

TABLE 5

Kenya Chemical and Food Corporation

Expected Date for Commissioning		: October, 1980
Quantity of Molasses required		: 110,000 tonnes per annum
Products:	Power Alcohol	: 20 million litres per annum
	Dry Bakers Yeast	: 1,800 tonnes per annum
	Citric Acid	: 3,000 tonnes per annum
	Vinegar	: 2 million litres per annum

Total Project Cost Kshs 502.5 million (US$67.0 million)

Managing Agents - Advait (Madhvani) International

SOURCE: Odidi, O. (32:p.46).

In Kenya, required review and appraisal of the project, according to established regulations, was ignored. For instance, the designs of the proposed projects were not studied by independent experts. The now admitted design faults of both KCFC and ACFC were therefore never identified and discussed in time (4,8). The External Aid Division of the Treasury was not asked, as is required, to give its

views on the possible impact of project failure (32:p.37), in foreign exchange terms, on government finances.

Kenya's bureaucracy depends on a civil service trained in containment procedures (33) and ministerial positions that do not require particular expertise. The civil service is relied on to implement technical projects despite acknowledged doubts about its capacity to handle non-routine programmes. Some ministries, like Agriculture, often suffer project overloads (over 200 in 1990) but are not required to engage external expertise. Instead the discretionary use of expert facilities leads to its use in inter-departmental conflicts.

For instance, the Ministry of Agriculture has been known to engage foreign consultants to legitimize its decisions on the sugar industry that conflict with KSA recommendations. One such consultant even recommended the dissolution of KSA (6), although this was not part of the terms of engagement. KSA did not, therefore, find it unusual that KCFC and ACFC were approved before a request was sent to them for data on national molasses levels (6), data already too late to inform decision.

It is not that Kenya's civil service is ignorant of business practices. Civil service regulations permit engagement in business by incumbent officers and many indigenous entrepreneurs are former public sector employees. But this fuels suspicions of conspiracy

when their actions and decisions contravene guidelines.

TABLE 6

MOLASSES AVAILABILITY 1979-1985 ('000 METRIC TONNES)

FACTORY	1979	1980	1981	1982	1983	1984	1985
Miwani	12.0	14.0	18.0	20.0	22.0	23.0	25.0
Chemelil	17.0	17.0	17.0	17.0	17.0	18.0	21.0
Muhoroni	15.0	19.0	20.2	24.0	24.0	26.0	26.0
Mumias	38.7	53.0	53.0	53.0	53.0	53.0	53.0
Nzoia	16.7	19.5	20.0	24.0	24.0	24.0	24.0
Ramisi	8.5	10.5	12.1	12.1	13.0	15.0	17.0
Sony	-	16.0	20.0	24.0	24.0	24.0	24.0
Others	2.0	2.0	2.0	2.5	3.0	3.0	3.0
TOTAL	109.0	150.0	162.3	176.0	180.0	186.0	193.0
PROJECTED CONSUMPTION OF MOLASSES							
Miwani							
Distillery	5.7	6.0	6.0	6.0	6.0	6.0	6.0
Exports	74.6	78.6	15.1	-	-	-	-
Animal Feeds	29.6	30.4	31.2	32.1	32.8	33.7	34.6
KCFC	-	35.0	110.0	110.0	110.0	110.0	110.0
ACFC	-	-	-	50.4	63.0	63.0	63.0
TOTAL	109.9	150.0	162.3	198.5	211.8	212.7	213.6
BALANCE	-	-	-	(35.9)	(41.8)	(32.7)	(26.6)

SOURCE: Kenya Sugar Authority and Ministry of Livestock

Conspiracy gets sustenance from conflicting inter-departmental information and decisions. For example, a survey by ISPC reported

that about 12,000 tonnes of molasses in the mid-1970s was used as animal feed but the Ministry of Livestock Development put it at about 30,400 tonnes (Table 6).

The Ministry projected a demand rise of 7.0 per cent per year while KSA put it at 3.0 per cent. The estimates by the Ministry were difficult to justify on current or projected livestock nutrition patterns in the country (2:p.74). But without incontrovertible data and information, informed debate was hampered.

4.2.1 The Gasohol Niche

Kenya's Oil Refinery, a parastatal, was built in the 1960s under the ISI framework to meet domestic needs and those of neighbouring countries. Initially built to handle 1.8 million tonnes of crude oil a year, it was expanded in 1969 to 4.8 million tonnes. Its introduction consolidated petroleum as Kenya's commercial energy base. It meant that attempts to introduce alternative liquid fuels would have to contend with this established interest in which government impartiality could not be assumed.

The government has an arrangement with representatives of international oil companies giving them the right to purchase crude oil, plan for its processing at the Refinery and organise a national distribution network. In exchange, the companies make their technology available to, and support, the refinery.

This arrangement between the Refinery and the international oil companies means that efforts at alternative liquid fuel sources must reckon with an arsenal of international experience in coping with potential competition. In Kenya's dependent scientific terrain, the participation of such sophistication can alter calculations intended to address domestic specific needs, and it did.

In 1973 Kenya lacked an independent operational mechanism or institutions for dealing with disruptions in normal channels of oil supply. The country could not advantage of concessionary offers from some OPEC members because it did not have an independent means to import and distribute the fuel. What is more, this would have infringed existing arrangements with the oil companies.

Kenya's GDP growth rate fell from 6.5 per cent between 1963-1972 to less than 1 per cent between 1973-5. Acute balance of payment problems followed. In **November 1979**, the **Ministry of Energy** was set up. The new ministry identified with the ethanol programme. But without independent data, it could not advance the cause of informed debate.

4.2.2 The Technology Scenario

Much of the sugar and ethanol technology requirements are within the design and construction capability of most large international engineering firms. There is no distinct ethanol technology market

as such, although some firms are reputed suppliers of distilleries to the beverage sector. Some of these are subsidiaries of large corporations. But these beverage-focused firms do not always have a high profile in ethanol. In 1977, Brazil was the main ethanol technology market following the launch of **Programa Nacional do Alcool (Proalcool)** and an institutional interest in ethanol going back to the formation of the **Institute for Sugar and Alcohol (IAA)** in 1933. This led to fuel ethanol technology trade being dominated by Brazilian firms like **Codistil**, **Zanini**, and **Conger** (34:p.127). The firms also supplied sugar technology because much of the equipment used here consists of fabricated vessels rather than intricately constructed machinery (14:p.47).

Firms from industrialised countries located in Brazil while Brazilian firms established links with them to access emerging technologies and supply their own (34:p.128). For example, Zanini entered into technical co-operation agreements with **Zahnraederfabrik Renk AG** of Germany and **Foster-Wheeler** of USA while Conger, whose technology PEC sold to KCFC, took up a five per cent equity in **Vogelbusch** of Austria, the technology suppliers to ACFC. Conger intended to access the stillage reducing technology from Vogelbusch (34:p.128).

Some of the firms supported university research. Oil companies also funded research in this area (34:p.130). For example, Atlantic Richfield Company supported enzymitic fermentation

research at Arkansas University during this period. The oil companies wanted to keep abreast with advances in this potentially competitive field.

The ethanol technology market that Kenya faced therefore consisted of a number of organisations whose design control was distributed over several sectors, including food, engineering, pharmaceutical, chemical, beverage and oil sectors. Many of the firms with the engineering capability did not, however, anticipate or seek markets outside Brazil (34:p.129). This made Brazil an important location from which to learn about this technology. But it also underlined the need for international technology reconnaissance because much initiative was required from the interested country if optimum terms of technology acquisition were to be ensured.

4.2.3 Institutional Project Management

The **Oluoch Okeyo** proposal was submitted ahead of the Madhvani version of **May 1977** (6). The Madhvani submission is reported to have had more technical data. But after the JVA was signed in **July 1977,** Madhvani re-submitted new technical data for the official portfolio. This has raised questions about the validity and object of earlier data.

It has been suggested that the first data was intended to undermine the Okeyo proposal. This would imply that Madhvani was privy to government records. It has also been suggested that the new

technical data may have been sought from Madhvani to be used to retrospectively justify the rejection of the Okeyo Proposal (35). What is certain is that the Madhvani Proposal constituted the standard against which the Okeyo Proposal was evaluated and rejected (4,6,8) confirming that the government did not have a separate independent plan or standard.

ACFC and KCFC emphasised different products (Tables 5 and 7) which made comparisons difficult. The ACFC proposal concentrated on potential financial returns while KCFC emphasised foreign exchange savings, employment, local sub-contracts, technology diffusion, employment for local specialists, improvements in food and nutrition and superior products for local production. Comparison was impossible without an independent national plan. In any case, a plan was required if the submissions were to conform to comparable standards. In the event, information from the proposals could not inform and improve decision making. What is more, no measures were put in place to ensure that the commitments in the submitted proposals would be delivered. The approval process was characterised by the kind of institutional weaknesses that Djeflat (36) has identified as undermining technology transfer efforts in LDCs.

TABLE 7

Agro-Chemical and Food Corporation (ACFC) - Muhoroni

Expected Commissioning Date	:	January 1982
Quantity of Molasses required	:	63,000 tonnes per annum
Products: Power Alcohol	:	18 million litres per annum
Active Bakers Yeast	:	1,104 tonnes per annum
Dry Fodder Yeast	:	550 tonnes per annum

Total Cost of the Project KShs.212,000,000 (US$18.4 million)

Government 56 % equity - IIC 34 % - VEW 10 %

Managing Agents - IIC (Mehta Group International)

SOURCE: Adapted from - Awilly, E. O. (3:p.13)

Madhvani and Mehta indicated plant costs of US$60.4 million and US$18.3 million respectively. These capital costs were not independently evaluated before approval. The Centre for Industrial Development (CID) of the EEC and the Africa, Caribbean and Pacific (ACP) countries reported to the Ministry of Industry in July 1977 that a plant with the capacity of KCFC should cost between US$18-24 million. But this information did not influence the signing of JVA (2:p.16). In 1978, an ISPC report also indicated that KCFC was over-priced. But this information was a year too late. A government team that visited Brazil in 1980 made similar observations on its return. Institutional learning processes were either initiated late or excluded from discussions.

There was no independent assessment of national ethanol needs prior to decisions on the proposals. National needs later had to be tailored to decisions made by PEC and Vogelbusch. The proposals were considered in isolation without local technical input or contributions from local industrialists (4,6,8,33). For example, engineering firms in Kenya have proven capability in metal fabrication and have been involved in large and complex projects in the region. As was indicated, fabrication capability underpins both sugar and ethanol processing technologies. Local expertise in fabrication of stainless steel was demonstrated at a new brewery facility in Kisumu and in the components of a geothermal plant in **Olkaria,** near Naivasha.

Fabricating brewing distillation columns demands more skill than that for fermentation plants used in ethanol production (4,6,8). Geothermal columns must stand high pressure steam and have to undergo X-ray testing. This is a higher quality requirement than that expected in ethanol fermentation or sugar processing.

But this established local capability was neither sought nor utilised for the ethanol programme. The finance-technology-supplier conditions negotiated by Madhvani and Mehta, and the absence of a national institutional framework requiring use of local technological capabilities precluded this step. Excluding local technical input gave the projects an unnecessarily high foreign exchange content which required government guarantees.

This exposure was used to justify government equity participation. But equity prevented rigorous evaluation and search for alternatives.

It has been pointed out that any experienced chemical engineer or sugar technologist would have identified the design problems with both KCFC and ACFC (4,6,8). However, no such local expert was included in the government team. Decisions were influenced more by financial sourcing than socio-economic or technical considerations (4). This is a practice that has contributed to the bureaucratisation of technological decisions. The result is that technology choices are consistently left to contractors and financiers (4,6).

But the government did not search for and compare alternative financing sources either. The efforts of PEC and Vogelbusch, as repackaged by Mehta and Madhvani, were accepted as adequate. PEC and Vogelbusch arranged for loans with their respective local banks but made it conditional on their supplying the technology. Vogelbusch supplied its new, and yet untested, **cascade process.** Madhvani accepted the **batch process** fabricated by Conger despite indications in the proposal that PEC would deliver a **continuous process.** Lax institutional management of the implementation phase allowed early breaches of the contract. These infringements increased with time.

Kenya's institutions also failed to identify the Vogelbusch/Conger connection. The Batch process delivered by PEC from Conger was an adaptation of an Austrian technology transferred to Brazil in the 1930s (2:p.149). Through its equity in Vogelbusch, Conger also had access to Vogelbusch technology (and vice versa). The country could have negotiated a more favourable disposition for two orders from either Conger or Vogelbusch. But there were no institutional procedures to explore such possibilities.

Little institutional learning has taken place in the ethanol sector. ACFC still maintains stocks of Vogelbusch supplied spare parts and retains it as consultant. ACFC argues that the equity of VEW assures it of a favoured status with Vogelbusch (8). ACFC has therefore not seen the need to be familiar with the plant designs and blue prints. These ares still kept by Vogelbusch in Austria. ACFC believes that this arrangement speeds up trouble-shooting communications and orders for parts. However, such institutionalised complacency perpetuates the dependence circle. The arrangements have the institutional backing of units like KSA which itself keeps a list of approved spare parts suppliers to the sugar industry. Orders with foreign currency implications are checked against this list before the Central Bank can approve expenditure. The list is rarely updated as KSA argues that this technology sector is stable and that it is loyalty to suppliers that ensures sympathetic terms (6). The reality is, however, different. In any case, it does not nurture learning and

independent capability building.

Bureaucracy and compartmentalisation of government departments undermined and delayed implementation of the projets. Thus, the release of land for siting KCFC was delayed because some departments considered the amount of land and approved lease term excessive. Despite KCFC being a government controlled corporation and the council in Kisumu giving the land, the Ministry of Lands and Settlement in Nairobi withheld its approval. The Ministry later compensated KCFC for the delays.

The delays proved costly in foreign exchange terms at a time when the value of the Kenya Shilling was in decline vis-a-vis convertible currencies. For example, the Swiss loan for KCFC equipment was signed in **November 1977**, but the papers were not presented to Parliament until **June 1978** (2:p.191). KCFC missed the tender price deadline and had to start fresh negotiations at escalated prices. This delay added KSHs.18 million (US$2.4 million) to the cost of KCFC, a sum equivalent to the payment made to Conger for the equipment (2:p.192).

Delays in approving marketing of ethanol also caused problems for ACFC. The rapid devaluation of the Kenya shilling - by 15 per cent in **September 1982** and 14 per cent in **December 1982** - under IMF pressure (37:p.603) increased interest and loan repayment liabilities to Girozentrale und Bank. Although commercial

production started in June 1982, marketing was delayed until May 1983 and full operations until 1985.

The total cost to ACFC of the prolonged plant closures was estimated at KShs.3.0 million per month. The cost of the project escalated from **KShs.259,582,000** in **October 1980** to **KShs.300,208,000 in January 1983** - much of it due to exchange rate fluctuations (8). The plant and machinery were, unlike KCFC, however, supplied under a fixed price contract and did not face similar cost escalations (8). ACFC failed to pay its first loan instalment to Girozentrale und Bank due in **December 1982** and an application had to be made to reschedule the loan.

KCFC engaged **Epcil (Kenya)** to undertake civil engineering work from **June, 1979.** But Epcil withdrew from the project in **January 1980** claiming turnover problems and went bankrupt (2:p.168). The contractual breach was settled out of court, in case litigation delayed construction, and the circumstances are still unclear. The work was then re-tendered to **Solel Boneh**, an Israeli firm. The erection phase was managed by an Indian company - **Deweto International** - under a **PEC sub-contract.** Therefore, local participation was also precluded from civil works. But studies of Kenyan engineering by Bennel (38:p.312) and Matthews (39:p.70) point to civil engineering as the most developed. Instead all civil work decisions were made, and work undertaken, with little local technical input.

Without local participation, the open-ended contracts allowed contractors to inflate foreign exchange costs. Whether by default or design, higher capital costs positively influenced management fees. Raising pre-start up capital costs raised earnings. This made delays in construction beneficial to management agents because they could capitalise such expenses. In any case, they continued to generate revenue as long as there was some work on site. There was no time specificity or clauses in the project agreements that penalised delays.

4.2.4 Management Contracts

Both ACFC and KCFC were proposed as turnkey projects to be managed under **Technical Management Contracts** by the **International Investment Corporation** (IIC) **of Bermuda** and **Eximcorp of Panama** respectively. In practice, they were managed by local resident members of the Mehta and Madhvani families paid in foreign currency. The management contracts were open-ended, had low attainment targets and were difficult to enforce.

The **Project Implementation Management Agreement (PIMA)** between KCFC and Eximcorp, for example, gave Eximcorp an annual management fee of US$150,000 payable to a London bank. Eximcorp were also to receive five per cent of all capital expenditure (except the cost of land) on the project upon its completion, in US dollars. Eximcorp would receive two per cent of KCFC sales monthly, in US dollars, and three per cent of KCFC's annual profits before

interest and tax deductions. The terms had no productivity targets. Eximcorp carried no risks but would continue to receive income whatever befell the project. The government accepted the terms without making alternative proposals and without negotiations (6).

Higher capital costs had implications for ethanol prices and could reduce its competitiveness. But the government carried all the responsibility for marketing ethanol. In any case, the market niche was protected. Eximcorp had little incentive to keep costs low and ensure ethanol was competitively priced. There were also no clauses requiring PEC to search for the cheapest source of equipment. The extent to which the activities of Eximcorp and PEC inflated costs has fuelled doubts about whether Madhvani intended to bring KCFC on stream at all.

The unequal sharing of responsibilities and liabilities between the government and the other parties was entrenched by the interlocking partnership of the investors, particularly elaborate in the case of KCFC. For instance, the JVA made the participation of Chemfood Investment Corporation (CIC), with 34 per cent equity in KCFC, conditional on the **Technical Engineering Agreement** (TEA) appointing **PEC** as machinery and equipment suppliers. Similarly, **Advait International's** 15 per cent equity was conditional on the appointment of **Eximcorp** (Panama) as project managers.

But in the JVA, PEC and CIC are represented by the same signatory and give the same office, telephone number and address in **Mannedorf**, Switzerland. Advait and KCFC also have the same signatory, **Nittin Madhvani,** and Madhvani admitted to owning Eximcorp (40:p.1). Therefore, KCFC consisted of the government and two interlocked investment groups selling equipment and finance and managing construction. Nobody in this group had previous experience in ethanol technology.

These complicated arrangements are not recognised in government documents prior to signing of JVA. Rescinding parts of either the JVA, PIMA or TEA was precluded by other sections of the contracts. Cancelling the whole project would however leave the government shouldering all liabilities plus a **force majeure** compensation of US$500,000 in foreign currency to Eximcorp. In any case, records confirm that the Attorney General's recommended amendments to the JVA were not considered by the National Projects Committee and did not therefore inform its decision process (2:p.16).

The Mehta Group opted for a fixed annual management fee of KShs.600,000 payable in Swiss francs and a five year management contract although IIC is still managing ACFC (8). The partnership of VEW led to Vogelbusch being appointed technology suppliers and consultants. But it also gave ACFC a powerful ally in the form of the Austrian Embassy in Nairobi who were able to pressurise Kenya's bureaucracy in a manner that only a government with leverage could.

4.2.5 The Feedstock Controversy

As indicated, molasses supply was an early issue of contention. In 1978, Madhvani unilaterally reviewed the KCFC Proposal (Table 8 and 9).

TABLE 8

Product	Original (May, 1977)	Revised (March,1978)
Fuel ethanol	9.2 million litres	16 million litres
Citric acid	2,200 tonnes	3,000 tonnes
Dry baker's yeast	1,200 tonnes	1,000 tonnes
Fresh bakers yeast	1,700 tonnes	3,000 tonnes
Vinegar	1.7 million litres	2.2 million litres
Sulphuric acid	--	7,500 tonnes
Ammonium sulphate	--	2,000 tonnes
Oxygen	--	6,800 tonnes
Methane	--	60 billion BTUs

SOURCE: C. Juma (2:p.25)

This pointed to the open nature of the contract and lax institutional supervision of implementation. This is identified by Djeflat (36:p.155) as an attendant danger in "open-ended product-in-hand turnkey contract" packages. Djeflat points to the tendency among contractors, in such circumstances, to inflate prices and include superfluous infrastructures and security measures.

TABLE 9

KCFC CAPITAL ALLOCATIONS - 1982

Unit	US$ million	Percentage
Citric acid	49.7	39.8
Yeast	36.9	29.5
Ethanol	23.0	18.4
Anamet water treatment	7.6	6.0
Vinegar	4.1	3.3
Oxygen	2.6	2.0
Sulphuric acid	1.2	1.0
TOTAL	**125.0**	**100.0**

SOURCE: Kenya Chemical and Food Corporation - Nairobi, 1981.

KCFC activities were characterised by this trait (Table 10 - overleaf) starting only months after approval. Notable in the KCFC revisions was the tilt of the project *away from ethanol, the* initial centre-piece of the approval process (Table 9).

TABLE 10

KCFC CAPITAL ALLOCATION (KSHS'000)

ITEM	ORIGINAL	REVISED
Land and preparation	2,125	10,702
Buildings	14,450	17,849
Machinery and equipment	385,900	564,619
Oxygen plant	-	13,478
Sulphuric acid plant	-	6,584
Fire fighting equipment	-	3,750
Factory equipment	-	6,640
Incoming water system	-	5,082
FEAL	3,859	4,755
Sales tax	38,590	59,649
Clearance/freight/insurance	3,400	21,747
Erection and commissioning	17,000	40,126
Training	2,125	2,142
Furniture and fixture	-	2,677
Water treatment	1,700	-
Vehicles	12,750	10,711
Pre-start expenses	17,000	114,897

SOURCE: KCFC quoted in Juma, C. (2:p.25).

It is now thought that the KCFC revisions were intended to pre-empt moves to approve ACFC through cornering of molasses supply. The Mehta Proposal was submitted in **February 1978** and Madhvani submitted the revision in **March 1978** (Table 8). The original KCFC

proposal was designed to use 55,000 tonnes of molasses annually. The revised version required 110,000 tonnes per year (Table 5). With the ACFC proposal of 63,000 tonnes (Table 7), Miwani requirements (Table 6) and the Ministry of Livestock Development projections, adequacy of molasses became doubtful. However, in **July 1978** the government approved and took 56 per cent equity in ACFC. Government decision making did not seem concerned with such details. But KSA was asked to supply data on national molasses availability, although this could not have influenced the direction of events (6).

Both ACFC and KCFC were designed exclusively for molasses. This was unnecessary because only minor adjustments were required to the technology to enable use of molasses, cane juice, or a combination of both. This design failure however gave molasses undue importance at a time when the country was faced with excessive cane supplies, inadequate factory outlets and cane rotting in the fields. The choice of technology for Kenya's ethanol programme had failed to address local peculiarities.

Juma (2:p.169) points out that Zimbabwe's concurrent programme addressed this issue. **Triangle,** the Zimbabwe company, chose to design and instal two plants able to use, molasses, cane juice or a combination of both. Zimbabwe was concerned with sugar market fluctuations and this design flexibility integrated the alcohol programme with the rest of the sugar industry. In Kenya,

technology choice was left to Vogelbusch and PEC without adequate briefing from their local partners. Flexibility was required by both the sugar industry and the ethanol programme.

KCFC wanted long-term molasses supply commitments from the sugar mills. It argued that molasses had a zero opportunity cost. But sugar industry representatives countered that a resource with an effective demand could not have a zero opportunity cost. The mills had reversed their stand but the low institutional memory of the arbitrating organs of government undermined their role as effective brokers in the government arranged series of negotiations that followed.

KCFC wanted a ban on export of molasses, a practice applied in identified strategic input in other industries. This is the case with, for example, scrap metal, considered a strategic input for the informal sector (41). KCFC also wanted the price of molasses sold to it to be fixed. Prices of all inputs and outputs in the sugar industry were regulated anyway.

But the mills preferred to sell on the most competitive markets available because world prices showed an upturn. The mills also successfully resisted the imposition of export duty on molasses which would have encouraged local utilisation. During the negotiations, no reference was made to previous studies by Tate and Lyle and ISPC that had identified ethanol production as a way of

stabilising export price fluctuations and the attendant pollution dangers (6). This failure to use previous studies to inform negotiations illustrated weak institutional memory, a disregard for learning processes and lack of preparation on the part of the government.

The government asked the parties to negotiate procurement procedures and fix prices but did not specify direction, time or framework of policy to guide negotiations. As a result the parties concentrated on short-term returns and past studies, reports and information in government custody was not used to inform negotiations.

Without the benefit of government direction, Miwani saw KCFC as a threatening its own future plans and announced intention to expand its spirit operations. Mumias (3:p.137), Sony (4) and Nzoia started nursing ambitions of annexing their own ethanol plants. The mills could not therefore give long-term guarantees on molasses.

But a decade later, nothing has come of the Sony, Mumias, and Nzoia plans and when Miwani shut down in 1988, there was no evidence of expansion work. In any case, Miwani did not replace the production manager of its spirit operation when he moved to ACFC in 1983 (8). Miwani's expansion proposals were intended to bar the entry of a potential competitor but the actions of other mills reflect

undirected and uninformed negotiation process.

Without reliable independent data and guidelines, government arbitration lost objectivity. Frequent changes in departmental representation at negotiations also weakened institutional knowledge and competence to arbitrate. Without departmental guidelines, representatives articulated personal views which confused matters (8). The initial broad goals of the ethanol programme were not referred to. Nor were matters of plant design, technology choice and selection, and feedstock flexibility adequately addressed.

In 1981, the Ministry of Energy suggested a switch in feedstock from molasses to cane juice pointing to national oversupply of cane and mill closures. But the decision was left to ACFC and KCFC who remained unwilling, without pressure, to make concessions and effect the technological adjustments. By the beginning of 1981, KCFC construction was 75 per cent complete and work on ACFC had began but this issue remained unresolved. This was still the case when KCFC construction was abandoned in 1982.

4.2.6 The Gasohol Blending Controversy

It was not until construction of KCFC was in progress that the oil companies indicated their disapproval of any blend that would require them to modify equipment and stations. The refinery also indicated its disapproval of any blend or blends that would require

modifications to the refinery process.

The companies wanted to conduct road tests, to ascertain the suitability of fuel ethanol, but paid for by KCFC. They also wanted KCFC to indemnify them from any legal liabilities arising from use, blending, handling, storage, sales, supply and distribution of ethanol (2:p.175). They wanted blending done at their depots while KCFC remained responsible for ensuring quality standards, delivery schedules and any costs of modifications, consumer education and legal costs.

Government arbitration was uninformed and weakened by a lack of departmental and individual continuity and the absence of a policy framework for conducting negotiations. Departmental representatives took sides and in the end no agreement was signed between the companies and KCFC. Matters were only resolved by government fiat. This indicated institutional weaknesses in managing negotiations and arbitrations.

There were also problems with the pricing formula for the blend. The oil industry proposed that KCFC sell to them ethanol at a price less than half the indicated production cost of KCFC (8). But at this price, the companies would have retained revenue from the differences in price between regular and premium petrol and earned fortuitous extra revenue. The companies would also use ethanol as a substitute for tetra-ethyl lead but would not include the savings

in the price they paid. Again no agreement came out of the negotiations.

Price affects the competitiveness of a product. But in both KCFC and ACFC feasibility studies, pricing of ethanol was not addressed. Only production costs were indicated. Whereas Madhvani expected the government to fix the price of ethanol, Mehta intended to free ride into an arrangement curved by Madhvani. Since ethanol costs tend to be higher than petrol, government intervention should have been anticipated and neutral arbitration abandoned in favour of directed negotiations. Failure to get early co-operation and commitment of the oil companies, as had been indicated by the ISPC report of 1976 (29) also proved an expensive oversight. Government guarantee of foreign loans made it an interested party in ensuring that the projects met their foreign loan obligations and were granted a price that would ensure this. But this reality was lost on government departments.

4.2.7 Consequences of Institutional Weaknesses

Lack of informed debate gave the ethanol programme a political twist. Government departments vied to defend their patch and adopted positions based on information supplied by the interested parties who took advantage of poor institutional knowledge of the sector.

For example, when the debate became public, KCFC management issued statements arguing that KCFC could not be compared to any plant in Kenya and, by virtue of its product mix, to any in the world (42:p.5). Nitin Madhvani rejected both World Bank and UN Industrial Development Organisation (UNIDO) criticisms as uninformed. It became difficult, in these circumstances, to get an objective picture of events and politics moved to the centre.

Because KCFC had the potential to become a big employer in this economically poor region, local politicians argued for strong government support and advanced "a conspiracy theory" to explain the unexpected difficulties facing the largest government-led project in the region (35). Nittin Madhvani accused the press of being "divisive and malicious" (42:p.5) and propagating the sentiments of foreign firms, presumably the oil companies who supplied the press with the information used to question viability of fuel ethanol programmes. The questions raised were credible because by 1981 oil prices were steadying. Selective presentations that excluded past reports and studies of the sugar industry and molasses disposal problems as well as the post-1973 energy crisis could appear quite convincing. Such presentations needed to be countered with comprehensive and holistic arguments.

Instead Madhvani appealed to patriotism. He argued that, in line with presidential calls for exports, KCFC intended to export citric acid and baker's yeast products (42:p.5) (Table 9). Nittin

Madhvani used this to justify the cost overruns but without specifying the export markets. In February 1982 (43), another press statement argued that KCFC was a pioneering venture comparable in complexity to nuclear and space technology development programmes in the US. It described KCFC as a "high-technology investment".

There were no informed responses to KCFC assertions. It was not pointed out, for instance, that KCFC was approved for completion in 1980 (Table 5) and that similar projects had been brought on stream, in time, in Zimbabwe, Malawi and Swaziland. Nor was it indicated that the unilateral shift of emphasis away from ethanol contravened the spirit of the JVA.

Inter- and intra-ministerial conflicts became public. For example, **on 16th May, 1979, the Minister for Transport and Communications** instructed his ministry not to participate on any of the committees discussing KCFC and ACFC. In effect, he was withdrawing the Ministry from an interministerial approved programme. This was in breach of collective responsibility and government operational procedures (44,45,46). The action highlighted operational weaknesses in government project management mechanisms. In any event, it advanced the cause of "conspiracy theory" (35) because the minister hailed from the central part of Kenya.

To improve institutional knowledge, the government sent officials to Brazil in **May 1980** to acquaint themselves with fuel ethanol production. They ascertained that Codistil had exported a 240,000 litres a day capacity distillery to Costa Rica in **1978** at a cost of **US$13 million.** This verified CID, ISPC and World Bank reservations on pricing of the KCFC plant. It contrasted with KCFC's 60,000 litres a day capacity that had cost Kenya **US$67 million.** A second group sent to independent Zimbabwe in **August 1981** recommended flexible feedstock, a suggestion the Ministry of Energy submitted for negotiations. But this knowledge could not change events already in place.

The supportive interest of the Austrian Embassy helped ACFC. Construction started in **April 1981** and was completed in **May 1982.** Trial runs were conducted in **June 1982** and commercial production was scheduled to start in **July 1982** but was delayed by the oil companies. When ACFC faced closure the Austrían Embassy made ít an agenda of Austro-Kenyan bilateral negotiations. The Embassy expressed concern that ACFC may default on Austrian loans. This led to stronger government intervention culminating in a series of directives that launched gasohol in Nairobi in April 1983.

KCFC had no such powerful intermediary. By 1980, project costs had escalated from KSHs.516,441,000 to KSHs.952,598,000 but work was not yet complete. The cost of generating one job at KCFC averaged KShs 1.5 million compared to the national average of KShs.120,000

(25:p.2).

When foreign loan syndication efforts failed, local creditors moved in. Solel Boneh ceased construction work in **December 1981** due to non-payment. In **April 1982**, PEC notified its intention to demobilize operations because Deweto could not undertake further erection work because the civil contractor, Solel Boneh, had stopped work. PEC demanded payment of SFr.1.1 million as demobilisation fees. In **May 1982**, the Power and Lighting Company disconnected power supplies claiming non-payment. In **August 1982**, Eximcorp resigned its directorship of KCFC because of non-payment of management fees. But national attention was also diverted in **August 1982** by an attempted coup by the armed forces which derailed government decision making for several months. By this time total capital expenditure at KCFC stood at **US$125 million** compared with US$27 million for ACFC.

KCFC was insolvent but not declared bankrupt. The World Bank reported that in 1983 KCFC had become a "subject of cabinet discussions regarded by the civil service as highly sensitive and confidential".

But KCFC had design and implementation faults (4,6,8). Despite the ethanol facility being 95 per cent complete, it could not be brought on stream until all other facilities (Table 9) were ready. But whereas the ethanol market was certain, the market for the

other products was not known. In any case, they had not been priority areas. Madhvani had unilaterally expanded the parameters of the project and created new additional problems.
Phased commissioning would have made it possible for earnings from ethanol to help fund completion of other units (8).

The siting also entailed prohibitive molasses transportation costs. Located in a town and not near a mill, KCFC was designed to use bunker fuel and electricity rather than bagasse. This would have raised operational costs to three times those of ACFC (8). Considering the pricing problems ACFC had to contend with, this lends credence to questions about Madhvani intentions.

In **January 1983**, the Ministry of Energy fixed the ex-factory price of ethanol on the recommendations of the Ministry of Finance. The Kenya Pipeline Company (KPC), a wholly-owned government venture, accepted to store ethanol at a fee and to supply it to oil companies for blending. KPC also undertook to purchase blending facilities which would be installed on the premises of the oil companies.

After the blenders were installed, the government directed the oil companies to start taking ethanol by a **legal notice** in **March 1983.** It gave them four days to run down oil stocks and prepare to receive ethanol for blending from KPC. On the morning of **April 16 1983,** motorists in Nairobi woke up to a new fuel on the market. A

decree by the Ministry of Energy overruled the **Traffic Act** which bars the use of any fuel other than that specified in a vehicle's licence. In **1985** the government directed that all petrol in Nairobi be blended with ethanol. This has permitted ACFC to attain current capacity of 75 per cent. All negotiations from 1978 to 1985 ended without an agreement.

4.3.0 Conclusions

The institutional management of the transfer of power alcohol technology to Kenya was characterised by weaknesses. There were weaknesses in documentation procedures which made operational diagnosis and accountability difficult. There were also weaknesses with operational guidelines which gave officers excess discretion in interpretation and application of regulations making the process unpredictable, subjective and susceptible to political manipulations. This encouraged lax supervision of project implementation which was abused by contractors.

There were cases of poor institutional memory. This not only weakened the quality of decisions, but it also undermined the ability of government departments to arbitrate. It contributed to poor preparation, bureaucratised decision making on technology matters and precluded the need for expert input and institutional learning. The fact that the government had no prior concept of the direction the ethanol programme was intended to take made preparatory effort discretionary and undermined institutional

competence. There was no transparent plan against which to evaluate proposals. This removed initiative and leadership from national institutions forcing them to accept, without validation, data presented to them.

Discretionary use of expert input and poor documentation of events and decision making processes weakened institutional memory, learning and the cultivation of expertise. The practice of not retrieving and using relevant past studies to inform negotiations and decisions encouraged a disregard for institutional learning and poor preparation before negotiations or arbitrations. This operational style could not nurture improved performance or transfer of experiences between projects.

Bureaucratised evaluation systems are not amenable to reviews and do not to take on board new developments. This is evident in the systems used to fix prices in the sugar industry and later to review KCFC (47,48,49,50). Alternative, broader and evolving systems are required for informed decisions that can manage change. Young economies like Kenya need to adopt, for example, diversified sources of commercial energy as a risk management strategy. Systems to evaluate such a programme would need to take into account local peculiarities. Such an approach is required when evaluating the sugar industry and the ethanol programme. Only the results of such a system would inform decisions.

However, diversity and flexible specialisation do not conform to established economic and financial concepts of specialisation, production efficiency, comparative advantage, international division of labour, economies of scale and opportunity cost. On this premise, there can only be one economically optimum form of energy generation or sugar processing which becomes dominant. But this leaves vulnerable economies without contingency mechanisms or strategies.

Existing tools of evaluation aim to establish single optimal ways of doing things. The case for diversity requires holistic cost benefit approaches able to take into account the benefits of economic stability, regional integration and national synergy in wealth creation. This can only be achieved at some cost to short-term returns and immediate efficiency calculations.

Kenya's experience in this case points to weaknesses in the operational modes of national environment enabling institutions. Since individual training in the institutions is professional, the problem must reside with the corporate operational styles. These styles preclude use of in situ expertise and prevent inventory of national capabilities even when necessary (51). To manage change, institutions need to be coordinated and consistent in order to support informed decision making, social learning and participative development.

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ACFC will actually be different. Both IIC at ACFC and Mehta at EASI were actually representatives of the same company. Strained relations between EASI and ACFC may thus follow this change and disrupt the shared facilities. ACFC receives 30 per cent of its molasses and all steam energy from EASI at special rates.

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IMPORTS OF SUGAR TRENDS 1984-1989 (tonnes)

	Production	Consumption	Imports
1984	372,000	341,000	4,000
1985	345,000	376,000	41,000
1986	369,000	381,000	126,000
1987	390,000	400,000	49,000
1988	412,000	485,000	42,000
1989	475,000	-	22,000

SOURCE: Various

* The discrepancies in the figures are officially attributed to smuggling but are more a reflection of poor documentation despite big government presence in this industry.

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5.0.0 NATIONAL CAR PROGRAMME 1984 - 1990

5.1.0 Introduction

On **27th February 1990**, two saloon cars and a pick-up were unveiled before the president of Kenya. They were prototypes for the national car programme. The Programme started in 1984 (1:p.4). It was announced that the prototypes and components were designed, developed and built locally (2:p.29). The vehicles were badged **Nyayo Pioneer.**

Developing the prototypes cost KShs.66 million (US$4 million). The saloon cars had an engine capacity of 1300cc used premium petrol and had a cruising speed of 120 kilometres per hour (kph). The pick-up, with the same engine capacity, used regular petrol, and had a cruising speed of 100 kph. All had four-cylinder engines.

A complete set of parts for the vehicles was on display imprinted with "Made in Kenya". This included engine block, crankshaft, steering wheel, gear box, electrical parts, cylinder head, carburettor, camshaft and pistons, among others. The components were based on specifications of the Kenya Bureau of Standards (KBS). It was also reported that international technical quality control procedures had been adopted (3:p.19) and that tests confirmed the vehicles as equalling any on the market (1:p.4).

The unit cost per prototype vehicle was put at KShs.160,000 (US$7,000). This would rise with commercial production. It was, however, intended that Nyayo Pioneers should be the cheapest vehicles on the Kenya market (2:p.29).

The first report on the National Car Project (NCP) was made to a Nairobi University students audience on 23rd February 1990. The next public comment was two days later. It commended NCP as a source of national pride that would advance Kenya's technological sector. It credited the engineers in higher learning institutions for this achievement "unequalled in Africa" (4:p.1).
The brief for the Project was given as "to produce a Kenyan car in the 1200-1600cc range with all parts designed and made in Kenya" (1:p.4). The Project was conceived on a political platform. It followed the president's challenge to national universities.

This chapter looks at how the national institutions set about defining, and interpreting objectives and working towards attaining them. It looks at the process of institutional and expertise identification and selection, information seeking and use, options explored, and the decision making processes. It also examines levels of institutional awareness of concurrent or related activities. The extent of goal and time specificity in the project and flexibility in implementation are assessed.

This chapter examines instances of lessons transferred from other

projects and sectors, the quality of information, documentation, and records used, and how these affected decision making.

5.1.1 Evolution of the Project

The following institutions are credited for NCP:

- Nairobi University, which headed the project and was responsible for design work;
- Kenya Railways, where fabrication and assembly was done;
- the Department of Defence;
- Kenya Polytechnic;
- National Council for Science and Technology (NCST); and,
- the Ministry of Industry.

The senior resource persons from these institutions made up the **Advisory Committee** of the National Car Project (3:p.13). This Committee reported satisfaction with funding and support for the project. This statement permits NPC to be assessed on the performance of its Teams excluding the dimension of financial constraints.

Notably institutional absentees from NCP include the ministries of Research, Science and Technology (MORST), Commerce, Finance/Treasury and representation from the local motor trade.

Plans for establishing **Nyayo Motors Corporation**, to be responsible for commercially producing the vehicles, were announced during the unveiling ceremony. This confirmed that NCP had operated as an ad

hoc gathering for six years. Such an arrangement deprives the operations of an enduring focus and location for gathering and accumulating information, expertise and experience. Five per cent equity in Nyayo Motors Corporation was offered to **Mitsubishi Motors Corporation (MMC) of Japan.** This was announced six months after the unveiling ceremony.

Land for assembly and parts plant was to be located at Athi River on the outskirts of Nairobi, a town designated for one of Kenya's Export Processing Zones (EPZs) (5:p.35). It was evident that Nyayo Motors was expected to produce most of its components. This is confirmed by the absence of representation of the components manufacturing sector in NCP and in the designing of the parts that were on display (6).

The intended output Nyayo Motors was to be 3,000 units per year, targeted at domestic demand estimated at 10-12,000 units annually (2:p.29) (Table 1). The president indicated his preference for a capacity of 100,000 units per year with the aim of including exports (1:p.4). This signified low goal specificity and poor preparatory groundwork in the designing of NCP. The niche that NCP targeted and the exclusive system adopted for sourcing components would have made it uneconomical to pitch production levels below 100,000 units per annum (7:p.10).

TABLE 1

Total Vehicle Production and Passenger Car Share in Some LDCs

COUNTRY	VEHICLE OUTPUT 1980	PASSENGER/CAR% 1980	VEHICLE OUTPUT 1987
Kenya	-	-	10,758 (now 12,000)
Nigeria	-	-	42,758
Egypt	-	-	23,455
Zimbabwe	-	-	3,000 (now 10,000)
Malaysia	100,971	84.4	82,500
S Korea	123,135	46.5	957,394
India	113,326	26.9	287,813
Brazil	1,165,174	40.4	1,069,000
Argentina	288,917	70.7	193,316

SOURCE Economist Intelligence Unit (7:p.11) and KMI (6)

Indications of low goal specificity were confirmed by the Ministry of Education's description of NCP as a deployment of "intellectual technical creativity" that put Kenya on "the threshold of becoming a high technology country" (3:p.12).

The Ministry asked Kenyans to feel proud of this national effort that confirmed the country's scientific and technical research capability. This capability would now be used to turn idle industrial capacity to tangible gain.

One analysis estimated that a production plant with an output of 100,000 vehicles a year and producing engine and transmission

systems in-house would cost between US$300 - 500 million. Therefore, with free land and tax concessions on machinery imports, a complete plant could cost around US$400 million (or KShs.9.2 billion at April 1990 exchange rates). This demanded strong government support at a time of public expenditure cut backs and restricted international borrowing. Such large outlays would also demand high levels of capacity utilisation to keep prices competitive against the internationally sourced vehicles assembled locally.

But NCP reports make no suggestions on funding options or on how productions levels are to be managed. Production and marketing did not receive adequate attention in the first six years of NCP. These considerations would have suggested alternative approaches to pursuing the national car idea.

Insularity characterised the management of this Project. This made it inflexible and unable to receive and ingest information. For instance, between 1983 and 1985 (8:p.154), Mitsubishi was a partner and co-financier in Malaysia's national car programme. The car came on stream in two years and the programme cost US$263 million. Mitsubishi had been a partner in the realisation of Korea's first national car, the **Hyundai Pony**, in 1976. It took two years. Mitsubishi also participated in a project to develop a **minicar** in collaboration with Hyundai Motors of Korea which was expected to take three years and cost US$373 million (8:p.52). Another minicar

project involved Korea's Daewoo Motors in collaboration with Japan's Suzuki Motors and was to cost US$219 million and take two years (8:p.84). These time periods include the product on to the market.

Information on such events and developments question the logic of spending six years on prototypes. It requires that NCP reports include clear indications on when and how commercial production is to commence and when the plant is to be set up. Information on these developments makes it difficult to justify spending that time on prototypes alone.

NCP reports show that the process of exploring avenues for production was only beginning at the time the prototypes were presented. This confirms that NCP did not keep abreast of relevant developments. It means that its calculations did not consider market realities. This indicates a weaknesses in project definition going back to 1984.

Keeping abreast with relevant developments would have suggested alternatives to the definition of the national car. Pemberton (9:p.16), for example, reports that by early 1980s the development cycle for new models, from conception to show-room, had dropped to under four years. The six years spent on NCP prototypes was thus unacceptable in this industry. The calculations by NCP were not in tune with the industry towards which they had the responsibility to

steer the country.

Other NCP calculations are also unrealistic. For example, the cost of "developing a new vehicle from the scratch" already approached US$1 billion in 1987. It was costing US$300-400 million to develop a new engine alone (9:p.16). These were competitive costs in developed and efficient locations. The costs were forcing the industry into collaborative schemes for product and parts development to cut costs, time, and ensure quality and price competitiveness. This information raises questions about the direction to be chosen by a project on a one-off budget and the time it should take. It emphasised the need for putting NCP in a clear industrial context. But NCP reports do not justify its progress in the context of realities that underpin the motor industry. As a result the reports do not inform projections on what is to follow.

Instead NCP reports urge "those concerned to make appropriate arrangements for mass production of the Kenya car" (3:p.13). This statement was directed at the government which, in turn, extended the invitation to Kenya's friends abroad. Responsibilities were left vague and there were no specific plans created by NCP and intended to inform subsequent discussions or negotiations.

NCP was financed through **National Universities Research Fund.** This Fund was raised from public donations and was intended to bridge

the gap in research financing at the four national universities. After NCP expenditure, KShs.20 million remained in the Fund (3:p.13).

The source of funding and official statements indicate that NCP was perceived as a research enterprise. It was described as a pursuit of research excellence and an application of findings to solving practical problems (3:p.13).

Poor definition of goals and objectives of NCP was encouraged by the insularity of participants. This remained concealed because the Project was classified. The participation of the Department of Defence added to the mystery. However, classifying NCP seems to have been an after-thought. For instance, an article in the November 1987 issue of **Science and Technology** (10:p.1) reports that NCST is "fully involved in the on-going research to produce a Kenya Car". KIRDI (**Kenya Industrial Research Development Institute**) (11:p.6) refers to the "Engine Project" as facing machining problems occasioned by lack of proper machinery in its 1985/86 Annual Report. This incident was recounted at the unveiling ceremony. KIRDI also reported that work on the "camshaft design" was handed over to a Workshop in Nairobi for fabrication. This refers to Kenya Railways Workshop, one of the largest and most sophisticated in the region, and a legacy from the East African (Economic) Community. It is confirmed by NCP account of events. But once classified, documented reports and references to the

national car disappeared. This supported the already insular nature in which the management of the Project was designed.

NCP subsequently evolved in an atmosphere of secrecy, insularity, poorly defined goals, objectives and time specificity. This weakened the learning process and was exacerbated by the ad hoc system of committees and teams. The absence of a continuing corporate body responsible and accountable for the success of the project undermined the cultivation of loyalty required for such an undertaking. This is evident in the chronology of events.

5.1.2 Chronology of Developments

The Car Project was built on the premise that low labour costs, reduced foreign exchange input, and increased use of existing industrial capacity would make the cars among the cheapest on the market. But this excluded other considerations. The local press, for example, faulted the "unusual" design and appearance of the cars as limiting their appeal (2:p.29). This was repeated by the Kenya Motor Industry Association (KMI) (6).

As prototypes for further development (3:p.12), additional costs to be incurred would raise unit cost above US$7,000 and weaken price competitiveness. The emphasis on local raw materials, personnel and specifications would also further push up the final price. Matters were more complex than NCP reports portrayed.

The **Advisory Committee** held its major meeting in **July 1986.** This meeting set out the criteria for design, provided indications on social utility, economic viability, use of locally manufactured components, aesthetic and external styling, and, specified engine capacity. It defined the objective as to "produce a vehicle with 100 per cent Kenya manufactured components" (3:p.13). It also selected the **Technical Committee** and set for it, what it considered to be, the priorities (3:p.13). These covered policy issues, design criteria and Kenyan needs. The Advisory Committee drew up these parameters without the benefit of experiences from Kenya's motor industry. The Technical and Advisory Committees then drew up a **Working Programme** and terms of reference for Technical Committee Teams.

The Technical Committee was divided into five **Development Teams** (3:p.13):

- **Body and Superstructure Team** responsible for design and development of exterior and artistic styling of chassis and superstructure;
- **Engineering Team** responsible for designing, developing and producing the engine;
- **Transmission Team** to design, develop and produce components of transmission system, including gears, gear casing, the differentials, and the fly wheel;
- **Suspension and Control Team** to design suspension system, beam axle and braking system; and,

- **Electrics Team** responsible for developing wiring harness system and to design, develop and produce electric items like starter, coil, alternator, and wipers.

The emphasis was on independent design and development. As a result teams replicated items in existing models (13). This emphasis on "copying" without regard for production costs or intellectual property created friction with Associated Vehicle Assemblers (AVA) representation on the Technical Committee (14,15).

The Technical Committee brief was to:
- identify, mobilise and utilise available resources relevant to the project;
- acquire and develop relevant expertise and technology;
- design, develop and produce the Kenyan Car; and,
- establish a bank of knowledge, specialists and facilities that would help develop a national industry and capacity to produce the Kenyan Car.

This Committee had the responsibility to constitute the required expertise within parameters set by the Advisory Committee. The identification, location and requisitioning (or exclusion) of relevant and known expertise resident in Kenya for (or from) the project was, therefore, the duty of the Technical Committee. The ultimate exclusion of resident motor industry input from NCP is thus the fault of this Committee. But also notable was the failure

to address requirements that would enable the country "develop a national industry and capacity" as required by terms of reference. The requirements for building the capacity for a sustainable national motor industry were not addressed in all the six years.

The prototypes used existing locally manufactured components like tyres, tubes, batteries, radiators, leaf springs shock absorbers, exhaust systems and break linings (3:p.13). These are based on KBS standards (3:p.19). But the Teams developed their own **"standard part numbering system"** for identifying parts. This "standard" was developed without local industry input. This has immediate and future cost implications.

Designing the "standard" without involving local components manufacturers makes it difficult to contract work to them later. Collaboration in drawing up of standards would ensure input from existing practice and the benefit of its experience. This would support subsequent commercial production of components for the national car. As it is, the possible benefits of local components experiences were lost to the Project. This affected decisions on how component kits were to be produced. The NCP could not competently address this issue and did not. But realisation of the national car programme depended on competitive sourcing of component kits.

The costs of insular operations included subjecting locally sourced

raw materials and end products to chemical and physical analyses and tests. It is inconceivable that local component manufacturers would not have done some of this already. But this knowledge was not sought. Insularity and the emphasis on local sourcing at any cost led to wasteful duplications. The Project Team reports spending 20,000 man-hours designing, casting and moulding the engine block before subjecting it to trials. But the general opinion in the industry is that this engine is unlikely to be adopted for commercial production if the vehicles are to be competitively priced (6,15,16). The limited production runs make its production uneconomical and NCP do not suggest other markets. This engine does not have any special specified qualities. It may also raise industrial property questions (13).

The Team reports having to "develop new processes" (1:p.4) to harden material required for "crankshaft, camshaft and connecting rods". The Transmission Team reports having to design own tooling and learning to harden gears. All development teams report "considerable efforts" (3:p.13) involving long hours with beds provided on site. But much of this effort was expended in reproducing existing procedures, processes and tools. Justifying this is difficult in a project intended to produce a marketable competitively priced product. NCP reports offer no justification. This emphasis on reproduction casts doubts about whether commercial viability of the vehicles and the need to "develop a national industry" (3:p.13) received consideration.

The origins of the idea in the political arena and subsequent secrecy makes a sequential study of institutional activities difficult. This contributed to low accountability. NCP also illustrates weaknesses in goal specificity and points to excessive discretion being accorded to members of the Project. This cannot support effective project management.

5.1.3 Institutional Project Management

The Project brief was reported as a challenge to the University community to "come down from the ivory tower and make a car, however ugly, and even if it did a mere five kilometres an hour" (17:p.3). This is an unacceptable way to spend public donations intended to advance research. But it reflects the latitude the Advisory Committee gave itself and the Teams.

It has been pointed out that imprecise terms of reference contributed to the absence of informed debate on the Project while secrecy shielded it from public scrutiny. The use of public collections instead of specified departmental allocations encouraged non-accountability in the institutions and individuals involved in the Project. The Project was not pre-costed and there were no set ceilings defining the work of the development teams (13). The market price of components was not used to guide product development work. But it is such considerations that should inform decisions on whether to produce a component in-house or to buy it.

The absence of a permanent and accountable organisation, institution or centre weakened the need for accountable decision making procedures. The membership of NCP was temporary and the loyalty of participants remained with original employers. Membership was institutional and not individual. This weakened continuity in the accumulation of expertise and interest. In the six years, individuals changed employers and left NCP. Coupled with poor documentation of decision processes, logical continuity and learning was difficult to sustain. Issues set aside for further review were often forgotten. Institutional memory could not receive adequate back-up without an accountable organisation being made responsible for the running of the Project.

NCP duties were part of other duties and were a temporary responsibility for both the individuals and participating institutions. No secretariat was set up to co-ordinate this exercise (12,13,). As a result continuity did not receive adequate attention because nobody shouldered the responsibility. In any case the future would have been difficult to address without the motor trade's input. No one in NCP had the relevant expertise and experience to address the future of the industry.

These gaps are confirmed by the short-term goals set by NCP. Its reports argued that the prototypes confirmed the worth of Kenyan scientists and that it was now up to the Government to conceive and set up the structures for mass production (18:p.1). The

implication was that NCP had successfully accomplished its tasks. But this is not correct even by the standards of the terms of reference that it gave itself. NCP did not, for instance, leave informed proposals on considered options for developing the national motor industry and the national car.

NCP attempted to portray its efforts as an academic undertaking that highlighted the nation's potential for research and innovation. This points to inadequate definition of research parameters. The gaps have created evaluation difficulties. But inadequate evaluation undermines projections for the next phase of the programme.

The absence of the Ministry of Research, Science and Technology (MORST) contributed to gaps in the definition of project objectives. Whereas NCST advises on research, it is MORST that administers and is accountable for conduct, direction and adherence to procedures and standards in research. MORST would have been expected to ensure a proper definition, interpretation and conduct of research parameters. Its absence created a loophole in institutional accountability and weakened capacity for goal definition and attainment. This permitted extravagant claims of research achievements to be made by NCP Teams in a political forum at which they could not be subjected to questions and made accountable.

The absence of the Ministry of Commerce prevented the use of accumulated institutional project management experiences such as those in the records at the Industrial Survey and Promotion Centre (ISPC) library. The absence of the Treasury and Ministry of Finance representation removed financial discipline from the exercise. The result of these gaps in crucial institutional representation is that the NCP objectives were not rigorously defined or pursued. For instance, it was not deemed necessary to justify the need for three prototypes when the usual practice is to develop one. Thus NCP spent six years developing products whose final destiny remains unspecified.

A self propelled vehicle cannot qualify as a researchable idea. As Pemberton (9:p.16) explains, development research in the motor industry is focused on specific items or areas. These include fuel economy, safety, cheaper production methods and processes, use of alternative substitute materials like fibre-optics, plastics and ceramics, pollution control, body styling, increased reliability or information technology applications. But even over such specificities, the costs and expertise required demands broad-based collaboration if commercial competitiveness is expected. The credited NCP institutions did not represent adequate expertise and did not seek to recruit it (6,13,19).

The self-propelled vehicle is only researchable when issues and dimensions to be addressed are identified and specified. This is

the case with, for instance, ongoing work to develop the **minicar.** Major motor corporations in Korea are involved in efforts to produce a 600-1000 cc small urban vehicle with a price tag of around US$3,000 (7:p.47,8:p.84,8:109). Similar efforts are taking place in Brazil (9:p.53), India (7:p.70), Taiwan (7:p.72) and several other countries.

Developing the minicar is a research effort that has underlined and exercised the multi-faceted nature of this industry. It has involved several corporations, disciplines and independent research centres. The concept developed from a realisation that the motor industry, as currently structured, cannot generate a product within the income reach of most LDC residents. It is a search for a cheap, reliable, low fuel consumption and low maintenance car. It is the result of surveys that have noted that Asia's crowded cities point to the need for small bodied frames and recognised the lack of popularity of large American cars in Latin America. The minicar concept is a synthesis of observations from engineers, economists, environmentalists, anthropologists, designers and mainstream motor industry experts from several continents.

NCP reports indicate little effort being applied to the identification and definition of the problem and niche but much effort to making the prototypes. A solution was being devised for a problem that was not clearly specified. The gaps in institutional representation makes it difficult to isolate the

cause for this unusual order of priorities. It is difficult to decide whether it was caused by the absence of required expertise in the country or whether it was the way NCP was designed that prevented the search for and use of existing resources and expertise.

The NCP research claims would face problems outside the political forum at which they were made. The claims breach known standards, definitions and procedures of research but do not give explanation or justification for it. Questions on whether "Nyayo Pioneers" qualified as original Kenyan inventions remain (21:p.7). One view is that they represent the ability to assimilate, utilise, adapt or imitate modern technology, but not new inventions. It is pointed out that the source of inputs like dies, moulds, and patterns (DPMs) is not credited or acknowledged. As Tsuma (21:p.7) stated, everything "cannot have been manufactured by the sole use of Kenyan expertise and know-how". Imported technology used in the process needed to be indicated. In proper research, credit is awarded where due. But the broad claims made by NCP reports do not award credit. This makes evaluation of NCP difficult.

It is difficult to evaluate NCP in the context of a national skills inventory. It failed to identify gaps that may require borrowing or buying-in expertise to bridge. The technical skills gap is considered a major weakness in Kenya's industrialisation efforts (21:p.7). But NCP failed to contribute to the improved

understanding of the problem. Another gap is the level of theoretical skills needed to unpackage, select and bargain for technologies required from a forest of patented technologies and packages around the world. NCP was an opportunity for testing and evaluating national skills in this area and to search for alternative technologies required to activate Kenya's idle infrastructure. But poor goal specificity prevented clear diagnoses.

Gaya (22) argues that the criteria for NCP remains known only to participants who are bound by an oath of secrecy under the **Official Secrets Act** and, as interested parties, could not be expected to be impartial. This obstructs objective evaluation. Therefore, even reports of prototypes being "100 per cent local" should not be accepted without tangible data, technical specifications, or without subjecting the claims to impartial evaluation. Gaya reports that at the unveiling ceremony, access to parts and components on display was restricted and no questions were entertained. The Department of Defence personnel actively discouraged all curiosity. He concludes that "the research, design, production and future of Nyayo Pioneer still remained a mystery" six years and US$4 million after it began.

5.1.4 Terrain Realities

There was no need to classify NCP. Kenya faced spiralling vehicle prices, unfavourable balance of payments, deteriorating exchange

rates and an over-stretched public transport system. This justified a search for a cheaper national vehicle. The public was well disposed and a transparent and accountable system of project management would have cultivated active interest.

Public pronouncements on NCP needed to be accompanied by some technical specifications and sufficient information to inform and activate enthusiasm from potential buyers and public. Because NCP was locally and independently initiated and funded, a higher degree of accountability than is the practice was expected.

NCP will have served no purpose if mass production is not undertaken and existing demand met. It would also be of little value if the cars prove too expensive or uneconomical to run. What is more, the cars will not sell unless they are cheaper than foreign models. These are insights that should have informed decisions on NCP. But they could not come from an insular arrangement legally protected by secrecy. These questions are fundamental to the purpose of the Project and could not receive adequate attention under the cloak of patriotism. The Project needed to be put in the context of global realities.

Experiences show that once produced, vehicle specifications do not remain secret. The strategy should, therefore, be to emphasise strong points and to elicit and monitor public and industry reactions. This information is required for further refinements.

The incorporation of proposals from potential buyers makes the product more acceptable to them. This is important because success in the domestic market would be required to support export initiatives. Secrecy, therefore, was harmful to NCP.

The Project also raised and left unanswered scientific and marketing questions underpinned by product price, suitability and accessibility. The economics of production needed consideration. This includes calculations on the extent of losses per unit the country was expected to sustain before the venture became viable and self-financing. This would inform government decisions on subsidy and search for external financing. After all, members of NCP were aware that this was a time of restricted public expenditure.

Understanding the industry would have made it possible for NCP to suggest alternative or novel funding schemes. Such schemes include, for example, a system of payments per car sold. Royalty per car sold was the method used to partially finance technology acquisition, plant construction and training for Malaysia's Mitsubishi guaranteed national car programme (8:p.154). The scheme gave Mitsubishi the incentive to strive for Proton's export success. In Latin America, they have used debt/equity swaps and international bond issues (8:p.29). Use of alternative facilities would demand a more rigorous approach to designing project proposals than NCP engendered.

Such information and knowledge would also have informed the process of negotiating with Mitsubishi over participation in Nyayo Motors. As it is, NCP failed to address long-term realities and made no suggestions. Mitsubishi's partnership is, therefore, not a product of considered, debated and informed institutional decisions. There is little likelihood that the best terms possible have been exhaustively explored and negotiated for in this arrangement.

An opinion survey by the local press found motorists supportive of NCP but critical of the prototypes' body design and styling (22). They advised the involvement of specialists from the motor industry to advise NCP on tastes, body aerodynamics and future development. This was considered vital if the product was to reflect particular Kenyan conditions. This survey identified lack of market experience in NCP designs as a potential handicap in domestic sales which could weaken niche realisation in export markets. Motorists were aware that this sort of information and knowledge resided with the local motor industry, the expertise NCP chose not to seek.

The body design of the prototypes showed scant resemblance to anything on the market (23:p.21). They displayed "uniqueness of design" (22) and no attempt to imitate cars assembled or sold in Kenya or anywhere else (23:p.21). The **Superstructure Team** had interpreted the "100% Kenya car" idea literally.

But body designs reflect tastes and fashions. These are in

perpetual change. Body design is a competitive ingredient that has spun international operations. Organisations like **Ital Design**, **Bertone**, **Lotus**, and **International Automotive Design (IAD)** are international corporate operations dedicated to design work (8:p.30). This spin-off would not have occurred if body design was not a critical dimension in vehicle production. Kenyan motorists recognised this. The NCP team did not.

Fashion-oriented business is driven by currency and imitation. The "uniqueness" of Nyayo cars was, therefore, a hindrance. Replication in motor designs has been enhanced by the advent of CAD (computer-aided-design) and CIM (computer-integrated-manufacturing). This is illustrated by a convergence of designs across makes and models. This is also forced on the industry by short product cycles.

Deployment of innovative approaches and technologies has cut the time it takes a model from conception to production to under four years in leading centres like Japan. With the approach adopted by NCP, bringing the Nyayo Pioneer to production could take over 10 years. By not considering this reality and the critical need for currency, the efforts of the Superstructure Team, and others, could prove a waste of time in commercial terms.

Exclusion of known resident expertise from NCP has made many of its claims difficult to accept. This includes the report that Kenya

has the technical capability to produce the steel required to support motor manufacturing. This claim was made despite the country not having an operational steel plant. However, vehicle production is an integrated industry in which such specific capabilities require objective evaluation. O'Brien (7:p.14) emphasises that prices of key inputs like steel, must be kept to international levels if vehicles are to be competitively priced. He also emphasises full capacity production.

An in-house steel mill capable of producing the special steel needed for motor vehicles would be needed at the new plant because Kenya does not have such a facility in place. Kenya also suffers from an industrial sector that operates below capacity and is not efficient and competitive in acquisition of inputs from external sources. This means that Nyayo cars could incur the kind of costs that are unnecessary in a more technologically developed and efficient location. The NCP team needed to realistically explore the options available to the Programme in such an arrangement. As it is, NCP assumptions are not a true account of the situation. This can only hamper the continuation of the Programme.

Options to be explored should have included appraising every aspect of the production process and taking inventory of technology, skills and facilities in place. Having to import sheet steel, for instance, requires advanced institutional global reconnaissance capabilities if competitive prices are expected. Observers of

Kenya's motor industry scene identify the absence of an established steel industry and overseas competition as its two major threats to its successful development. A considered evaluation of required institutional capability should have been an integral part of NCP reports. It was not (13).

It is unclear whether NCP was intended as a purely academic or a technology capability building exercise aimed at creating an industrial-commercial venture. The reports do not explain whether the aim was to locally and competitively produce an affordable vehicle addressing Kenya's peculiar needs, or, to reproduce a self-powered road vehicle irrespective of cost.

As an invention, the car is not new. In fact, the original idea cannot be attributed to any one individual or country. It was the result of many individuals working simultaneously in several countries (24:p.24). This sometimes created intellectual property disputes such as the one over the **four-stroke principle** (25:p.596).

The modern automobile is now a complex technical system of more than 14,000 researchable parts (24). This reality argues against the "100 per cent Kenya car" principle followed by NCP. The aim should have been to competitively conceive, design and bring on stream an affordable and reliable product that is cheap to run and within a time frame that considers competition and imitation.

A proactive search for globally available knowledge and information with the intention of applying it to competitively produce a car constitutes innovation. Also innovative would be an exercise aimed at creating a car that better addresses peculiarities of the Kenyan market than anything on the market. But these researchable objectives were not the cornerstones of NCP.

The NCP reports make no references to state and operations of either the domestic or international industry. The domestic motor industry is trapped by foreign exchange restrictions on CKD (completely knocked down) kits imports on which local assembly depends. This trap needed to be addressed by a national car concept. A successful national car and its local components sector cannot be built on the existing foreign dominated arrangement of assembly-franchise-distributorship-dealer networks. This closely knit trading arrangement has made little technological progress and shows no signs of change. It has failed to create and support a local and growing components sector. Instead, the assembly sector continues to lobby for reductions in existing mandatory local content levels (14). Co-operation and integration in the industry is minimal. The national car should have been designed to integrate this sector. This was not considered.

The absence of local motor trade input left NCP without the specialisation to handle this issue competently. This is particularly so because motor industry skills are only peripherally

taught by training institutions in the country (27,28). This made the motor trade the only credible source of relevant expertise available in Kenya.

The 1200-1600cc niche targeted by the Advisory Committee has been described as "choc-full of competition" (1:p.5) with established models. Without a ban on competing imports, it would be difficult and expensive to take the 30 per cent sales that NCP reports envisaged. Pricing would be critical and impossible without subsidies. The unit cost of US$7,000 is the going price for established and reputable low cost vehicles in international and domestic markets. It is already undercut by models like Yugoslavia's **Yugo Florida** which entered international markets at around US$4,000. Price competition could not, therefore, have received the required attention by NCP.

NCP reports refer to intention to enter export markets. However, Kenya lacks relevant industrial experience and the reports do not elaborate on how this is to be overcome. This situation is exacerbated by negligible intra-African trade. In any case, the experience of projects like Malaysia's Proton indicate that acceptance in LDC markets depends on successful performance in developed markets. It is this that bestows technological credibility to a developing country product in the eyes of other LDCs.

5.2.0 Kenya's Motor Industry Scene

Kenya's position in the motor industry is marginal even by LDCs standards (Table 1 and 2). It is also in a region of insignificant production and sophistication levels. Africa's production levels have been falling consistently for two decades and its PCI (per capita income) levels cannot support a rise in consumption (7:p.7). Its production levels are well below scale economies of 100,000 units per annum (7:p.10).

TABLE 2

Indicators of Vehicle Use and Demand in Selected Countries -1987

COUNTRY	VEHICLE PARC (millions)	POPULATION (millions)	PERSONS/CAR	PC1($)
Kenya	0.26 (now 0.30)	21.0 (now 22.7)	167	284
Ivory Coast	0.25	10.5	65	712
Nigeria	1.41	105.4	134	806
Zimbabwe	0.26	9.0	51	572
Egypt	0.67	50.5	118.6	1,154
Morocco	0.64	23.7	53.1	54.2
Malaysia	1.49	15.8	14.1	2,007
S Korea	1.11	43.3	77.8	2,104
Taiwan	1.34	19.6	21.4	...

SOURCE Economist Intelligence Unit (7:p.7) and KMI (6).

Kenya suffers a combination of low PCI, high numbers of persons per

vehicle levels (Table 2), a low parc (vehicles in use) and effective demand levels (put at 18,000 per annum) that cannot support economic manufacturing at prevailing prices. Kenya has been described as a small, sophisticated, but opaque consumer market at a parc of **300,000** (Table 2). The country imports around 6,000 CBUs (complete built up units) annually. Local assembly production averages 12,000 units annually from three assembly plants (Table 1). But the market shows a unique preference for luxury cars that has given Nairobi "a higher proportion of Mercedes-Benz in its traffic than any city outside Germany" (6).

The supply side of the market is dominated by assembly and franchise-holding distributors who lobby for total bans of all forms of CBU imports. They argue that imports of CBUs deny the industry economies of scale and undermine efforts to rationalise the range of models (29:p.12).

The absence of transparency in the industry is attributed to the practice of "deliberate over-invoicing and false records" (30:p.16). The Kenya Motor Industry Association (KMI) admits to publishing statistics that are at best "educated guesswork" (6). The situation is exacerbated by the tendency of the local media to represent these figures as facts and by the absence of alternative verification mechanisms. Government departments also use the "educated guesswork" to inform their decision making processes. An unclear National Car agenda was therefore being introduced into an

already opaque environment.

Kenya's motor trade revolves around three assembly plants - **Associated Vehicle Assemblers** (AVA) located in Mombasa, **Kenya Vehicle Manufacturer** (KVM) based in Thika, and **General Motors (Kenya) Limited** (GM) in Nairobi. AVA is the largest operator with an output of between 50-60 per cent of national total. KVM is the oldest having come on stream in 1974 as **Leyland (Kenya) Limited.** The change in name occurred in mid-1989 following equity changes that admitted D T Dobie, local franchise holders for Mercedes and Datsun-Nissan, into the partnership (31:p.16). It also reflected the dwindling fortunes of Leyland UK's international operations and its merger with Holland's Daf to create Leyland-Daf. Another assembly operation, **Fiat (Kenya)**, which went out of production in late 1980s, was also located in Nairobi. The government is a dominating shareholder in the assembly operations.

AVA was founded in 1974 through a partnership between the **Industrial Development Bank (IDB)**, **Inchcape East Africa** (subsidiary of Inchcape UK), and **Motor Mart Group** (Lonrho UK's local motor franchise traders) as a **multi-franchise contract assembler** (32:p.3). In 1975, a **Joint Venture Agreement** was signed between the **Treasury**, **IDB**, **Inchcape**, and **Lonrho**. Assembly of Ford trucks began in **1977** and was extended to include Nissan-Datsun, Mazda, Peugeot, Toyota and Mercedes trucks. In **1983**, **Marshalls East Africa** purchased **Inchcape** shares. Marshalls, the local

distribution franchise holders for Peugeot and Volvo, is 85 per cent owned by **Marshalls Enterprises Ltd**, which is 100 per cent owned by **Somaia Group**, a family company (33:p.10). The Somaia Group are traders who bought Marshalls in 1989. Previously, Marshalls was owned by the **Aga Khan** community (a muslim religious group). This group purchased the business from **Marshalls Universal PLC** of **UK** who first established the East African regional franchise network for **Peugeot vehicles.** AVA, therefore, did not have the benefit of associating with an experienced or credible vehicle manufacturer.

AVA undertakes **contract assembly** of CKD kits. It is 51 per cent government-owned with Marshalls and Motor Mart holding 24.5 per cent each. Despite the government equity, AVA operates like a private company (15) and makes commercial decisions with little government intervention. This is a legacy of its privileged history. At its inception, AVA enjoyed close links with the then President whose family members headed regional operations of Lonrho and Inchcape, British trading conglomerates with wide ranging international interests (15,32).

No equity holder at AVA had relevant technical expertise or experience to transfer. AVA, therefore, illustrates a case of poor selection of partnership in a project intended to advance technology transfer. Instead, AVA operations have been tightly integrated to import franchise with assembly only serving to expand

the area of revenue collection for distribution and service franchise operations. Improving technology to reduce costs, for instance, has not been priority (15). Technological evolution was never intended and has not taken place. This is confirmed by the fact that the level of assembly technology and local component input has remained unchanged at AVA.

General Motors Kenya Limited (GMK) operations in Kenya are also majority owned by the government through the **Industrial and Commercial Development Corporation (ICDC)** (34:p.16). GMK started operations in Kenya in **1975** and, unlike AVA, is listed as a parastatal under the Ministry of Industry and as an ICDC share company (35:p.33). This indicates state equity of 51 per cent or above. But the management and control of operations remains under General Motors Corporation through a **management contract** (30:p.16).

GMK reflects divestment trends by US corporations through which they transfer equity to private and public local interests thereby reducing their exposure. They, however, retain control through **management contracts** (36:p.30). The strategy has been repeated at Firestone, Union Carbide, Bank of America, First National Bank of Chicago, Mackenzie Dalgety and Mobil (35:p.15,30). The management contracts ensure that operational and technological control remains under foreign minority interest but permits the firms to borrow locally to finance operations. It allows a situation in which local funds are used to finance operations that pass for foreign

direct investment (FDI). Little core technology is transferred in such arrangements and operations remain concealed from local experts. But the firms are able to make politically inspired demands for protection and monopoly status. Firestone, for example, has successfully used this strategy to block licensing of competition or competing imports since early 1970s (37).

At GMK, management, technological expertise and CKD sourcing is exclusively controlled by GM Corporation. This is confirmed by the assertions of the American Managing Director that GMK is part of the global operations of General Motors Corporation whose activities include collaborative arrangements in Japan, Canada, Europe and US (30:p.16). Strategic decisions on GMK operations are thus not influenced by developments on the Kenya market.

GM Corporation's global strategy straddles big names like Isuzu and Toyota in Japan, Opel in Germany and Daewoo in Korea among others. However, GMK is not a technology or marketing partnership like these others. GMK is an assembly facility intended to integrate GM's distribution interests in a market with a marked preference for Japanese and European models. As a result, GMK assembles none of its models in Kenya. It, instead, assembles Isuzu and the old Bedford.

Kenya Vehicle Manufacturers (formerly Leyland Kenya Limited) had an initial ownership structure of **Leyland International 45 per cent,**

Kenya Government 35 per cent, and **Cooper Motor Corporation** (CMC), local franchise holders of Landrover and Rangerover, **20 per cent.** The current structure is **20 per cent Leyland, 25 per cent D T Dobie, 20 per cent CMC**, and **35 per cent government of Kenya** (14).

The need for integration was the reason **D T Dobie** moved its CKD business from AVA to **KVM** (15). D T Dobie had expressed initial interest in equity at AVA. D T Dobie explained that "developments in local assembly were important and the company needed equity interest in it" (31:p.16) because it had become the only large franchise holder in Kenya without a direct assembly stake.

This statement clarifies the basis of assembly in Kenya. It is intended to enhance franchise operations and not to develop towards vehicle manufacturing. The latter avenue would demand restricted franchise to advance scale economies in parts and components production and specialisation. This would be in direct conflict with the prevailing mood and direction of assembly business which is towards diversity. KVM production remains below the design capacity of 4,500 units per year (31:p.16).

Kenya entered assembly under a framework of "progressive manufacture" intended to enhance national technological capability and reduce dependence on commodity cash-crops through export of high value items like cars. The assembly was to develop from semi-knocked down (SKD) kits to CKD and generate its own foreign

exchange (29:p.9). But no time specificity was given for this evolution nor was a defined master-plan drawn up. The result is an assembly sector costing KShs.40 million a month in foreign currency (about KShs.4 billion in 1989) (14). It is now the most expensive foreign exchange sector in the economy (15).

The striking feature of assembly is the absence of any emphasis on technology-based or manufacturing expertise. It is operated on the agenda of trading firms holding distribution and service franchises. Even GM and Leyland, despite their vehicle production pedigree, have tuned their operations in Kenya to assembly in support of import-distribution operations. KVM and GMK started as dedicated assemblers handling products of mother corporations. But this has changed and Kenya assembly is now largely contract. AVA has complained about this as a breach of a previous market segmentation agreement (15).

Local assembly claims "substantial export potential" and intention to enter regional export markets (38:p.57). But it is focused exclusively on the domestic market. In any case such a decision would not lie with local assembly but with franchise holders who must accommodate the international strategies of the original source manufacturers. These statements are, therefore, largely "commercial posturing" and only serve to add confusion to the sector. In any case the prices are so uncompetitive that local assembly vehicles only sell because of a total import ban. This

privilege could not be accorded in export markets.

Because of the high foreign exchange content of imported CKD kits, the level of activity in this industry depends on earnings from agriculture and tourism. It cannot sustain itself. Like Kenya's other manufacturing sectors the motor industry is "locked into a regressive spiral" (39:p.11). This is the case with Kenya's textile sector, partnered by middlemen rather than reputable textile specialists. The result is an ailing industry despite a blanket total ban on importations of all fabrics. This ban even extends to donations of second hand clothes from charitable organisations intended to cloth the poor. These textile ventures were, however, created to undertake exports and earn foreign exchange (40).

This import replacement trap is a product of a faulty tariff regime. This regime does not try to discriminate on the basis of the amount of local value-added or to remove tariff protection when an infant industry is required to have matured. Without time specificity, the motor industry has failed to nurture a viable local components sector that would have supported the national car. Instead, it now demands blanket import bans against privately funded individual imports of used CBUs. All participants in assembly (except the government) have distribution interests. They, therefore, do not have the incentive to advocate use of improved technology to enhance earnings. They advocate measures

towards a terrain that nurtures technological complacency.

The overall emphasis is that of traders consolidating distribution earnings through interest in assembly rather than manufacturers intent on improving technological capability. Technology acquisition, adaptation and development is peripheral. The focus is on margins at minimum risk, time, and effort and maximum protection in the domestic market. This is the vicious trap into which assembly has degenerated. It is unlikely to change without government intervention. To do this requires improved institutional information and knowledge. This is currently very limited. The NCP was an opportunity to improve this. It did not.

It is the fear of competition and the means to obstruct it that exercises minds in the industry and leads to proposals aimed at increasing levels of opacity in the sector. One such proposal is the **"Inland Exports"** scheme (41:p.21). Through this scheme, KMI asks the government to direct all foreign exchange expenditure on vehicles into the local motor trade. KMI proposes that all Kenyans with access to foreign currency and wishing to acquire vehicles be forced to buy the "Kenya-built cars" with the foreign currency but without being charged duty. It proposes that the scheme be extended to diplomatic and international communities.
KMI argues that this has "the same economic effect as exports" and is an avenue for "converting the value-added of Kenyan materials, services, components and labour into hard currency". It proposes

that this foreign exchange be then used to finance import of CKD kits. This is KMI's option for making this "industry self-financing" (41:p.21) in foreign exchange. Another scheme is **"privileged credit finance"** (42:p.10) through which KMI advises the government to give interest free loans to privileged public sector employees, like the armed forces, to be used in purchasing locally assembled vehicles.

"Inland exports" and "privileged finance" are schemes intended to conceal direct government subsidy by requiring it to forego duty and give interest free finance to the sector. It is an admission of the sectors inability to compete or export. It is an indication that the franchise holders based in Kenya may not be permitted by source manufacturers to intrude into regional markets and disturb global strategies. But most important of all, it is a recognition that it is increasingly difficult for these traders to openly demand such high levels of foreign exchange to support a small affluent niche. But instead of searching for genuine and sustainable solutions, leaders of this industry have opted to create an illusion of foreign exchange earnings and competitive performance. Like other import substitution industries in Kenya, they have opted to obstruct rather than face competition. It indicates their views on the competence and knowledge of relevant national institutions.

Obstructive tactics require an opaque terrain. But opacity has

created intra-industry frictions. For instance, under **Legal Notices 22 and 124** (43:p.11) all locally produced components listed cannot be imported. However, when assemblers and franchise holders complain about the quality of local components as undermining warranty commitments to source manufacturers, the proposals made often argue against their own protection.

The Legal Notice lists can be suspended with the approval of the designated component manufacturers if they admit inability to meet demand. But on occasions when this is done, importers flood the market with cheap imports. This leads to disputes (44:p.10). Although the parties share membership of Kenya Association of Manufacturers (KAM) and KMI, they often strive to undo what they collectively lobby for. Government tax concessions intended to, for instance, nurture the local components sector (45:p.12), are often undermined by demands by assemblers to revoke parts of Legal Notice 22 (46:p.42). This fray could have been resolved by efficient administration of standards. However, the credibility of KBS is low in all sectors of the industry and its seal approval inspires little confidence (14,19).

In this opaque terrain, statistics, studies and observations made by organisations like KMI and KAM need to be subjected to alternative verification mechanisms. NCP should have explored possibilities for setting up such mechanisms because success of the national car programme depends on it. But this was not done.

The sectors have failed to forge technology and commercial links. Partnerships would have made it possible to build a competitive components sector. As it is, the foreign owned, and run, franchise/distribution, supported by government funded assembly, wage a constant war against locally owned small component producers. The latter, however, use political means to force their products on assembly and service sectors. The government's equity presence in assembly only confuses matters by legitimising patriotic demands that do not inform debate in the industry (41:p.20).

5.2.1 Local Components Sector

A successful national car programme requires an efficient component sector (28). A Japanese professor in the motor industry, for example, is quoted as pointing to the initial failure to develop a viable components sector as a major weakness in Kenya's motor industry (44:p.10). However, in Kenya, assembly is regarded as the core of the industry. KMI admits that even within its new arrangements, the "local components sub-sector does not enjoy a high profile" (47:p.2). This is the result of the industry's emphasis on final products and technology packages rather than the constituents of technology. It is the trap of ISI strategy. This industrialisation strategy does not emphasise unpackaging of imported technologies. A strategy that favours unpackaging technology would emphasise components parts development as the strategy to advance the whole industry and the means to nurture a

national car.

Kenya's motor trade has not nurtured a self-sustaining components sector. Even government attempts in this direction have been unsuccessful. For example, in 1985, the government lowered customs duty and sales tax on locally-assembled vehicles to try and revamp the industry and the local component manufacturing sector. The changes included duty reductions on raw materials and other intermediate inputs like steel and sheet metal. Import liberalisation measures were instituted to facilitate processing of import licences for CKD kits and raw materials for local component manufacturers. Assembly operations were to progressively replace CKD kits with local components. This would then allow the manufacturers of components to improve economies of scale by supplying existing parc, the after sales market, and new assembly output (29:p.9).

But the strategy failed because the sector, as currently structured, cannot respond to local initiatives. Failure to create a competitive components sector is underlined by KMI's complaints of "the foreign exchange famine" (29:p.11) that afflicts the whole industry. Even the components sector does not earn foreign exchange.

This is not helped by the confusion that surrounds the sector. For example, KMI reports that local assembly vehicles "contain up to 30

local components, representing local value added in labour, parts and materials of up to 50 per cent of ex-factory cost" (29:p.11). But this report does not use the usual standards for measuring local content. This prevents comparison with similar sectors elsewhere (Table 3). It is difficult to devise ways of building the sector if objective evaluation is prevented. In any case 30 components in a unit with over 14,000 parts does not amount to much. What is more, KMI presentations of "30 local components" includes consumables like sealants, lubricants and glue (15).

Like with "inland exports" and "privileged credit" schemes, KMI has devised elaborate schemes to conceal the unimpressive state of the local components sector. This obstructs objective assessment which could lead to constructive and progressive measures to develop the industry. This has undermined the process of clarity required to conceptualise and realise the national car ideal.

Major local components depend heavily on imported raw materials (48:p.43). The local component sector is, thus, a foreign exchange dependent sub-assembly operation. For instance, the exclusive tyre manufacturer in Kenya, **Firestone East Africa**, a parastatal (35:p.45), has its products listed as "100 per cent local". But it is the international division that controls operations. There is little local exposure to the core business (36:p.29). As a result, the supply of rubber and process technology is exclusively controlled by **Firestone Corporation** and Kenya's technological

capability in rubber production has advanced little since the Corporation set up in Kenya in 1969. This is unlikely to change under current arrangements (15,37).

Tyres, exclusively supplied by **Firestone,** have little local content in them. Listing of tyres as "100 per cent local content" is therefore misleading. Similar definitions are applied to batteries, exclusively supplied by the subsidiary of **Chloride Industrial Division** of UK, and to other component parts. This sector, like the rest of the motor industry, is import dependent without earning its foreign exchange (14). This makes it a burden on other parts of the economy.

The local components list includes batteries, interior trims, tyres, radiators, springs, wiring harnesses, exhausts, seats, paint, shock absorbers, windscreens, flat glass, brake-linings, filters, U-bolts, O-rings, spark-plugs (Champion brand assembled in Kenya), lubricants from wholly imported petroleum, sealants, and adhesives (49:p.19). This list together, with local wages, forms KMI's definition of "between 35 and 50 per cent local value added" (50:p.24). The actual local content percentage is, however, very low (Table 3).

TABLE 3

Local Content Estimates of Local Production in 1988 (%)

Country	Passenger Cars	Commercial Vehicles
Kenya	15	
Nigeria	30	
Egypt	40	
Morocco	50	60
Malaysia	18-22	
S Korea	95	70-90
Brazil	90	90
Argentina	90	90

SOURCE Economist Intelligence Unit (93:p.13) and Various

The assembly sector imports most of its components. This includes even what is recorded as local content in their in-house operations. For example, AVA, on record, produces shock absorbers for Peugeot (15). But these are merely assembled imports and subject to foreign exchange availability. Even items like radiators, listed as local content in motor trade reports, are imported and subject to foreign exchange earnings of other sectors of the economy.

The component sector is subjected to attacks, rather than support and collaboration, from the foreign dominated distribution and assembly interests who do not consider technological development a priority for corporate survival. This is getting worse. For

example, the assemblers, through **Kenya Vehicle Manufactures Association** (KVMA) have recently successfully lobbied for the removal of glass and windscreens from Legal Notice 22 listings (14). They are canvassing for more reversals.

KBS standards have not been supportive. Quality faults in KBS certified goods emerge late in production, cause costly disruptions and drastically affects input. The poor workmanship of local components proves particularly costly in cases of expensive units because of the guarantee clauses (15). KVMA is, therefore, pressing for direct importation of finishings for such units directly from source manufacturers. Such moves will curtail the market for this sector and stultify its development further.

The local components sector is not favoured by the present structure of assembly in which only the original model owners define requirements to which assembly and franchise operations must conform. These requirements are based on global strategic considerations and are not empathetic to weaknesses specific to Kenya. They cannot make the temporary allowances needed to remedy the weaknesses. In addition, the many models in the country work against the potential benefits of standardising components (6). For instance, standards on fuel tanks could bring down the cost of the item. But the number of models in the country and the various specifications of manufacturers works against this (15).

Innovative measures that address local peculiarities, like the

introduction of power alcohol engines, which could give local components a niche specialisation are blocked because the industry is not structured to make local-specific decisions (14). AVA, for example, believes that such a decision would depend on KBS providing the standards for power alcohol engines and forcing the requirements on importers (15). But KBS draws up standards at the request, and with the help, of the industry responsible (51). It is a situation that perpetuates indecision.

Other than the large players like Firestone Tyres and Chloride Batteries, which are multinational operations and favoured under assembly conditions, the component sector is dominated by small family concerns. They resort to political intrigue to get a listing in Legal Notices rather than quality and pricing. Local component manufacturing has thus developed into a closed shop of a few family businesses that curve out the market by agreement (14). There is limited competition, contrived obstacles to entry, little drive for excellence, and a rush for quick returns on investments. Much enterprising skill and energy in the sector goes into lobbying for protection against competing imports (15).

This sector is dominated by oligopolies and protected demand because of total import bans. This allows them to operate as monopolies once they have partitioned the market by agreement. The market is then forced to bear the burden of inefficiencies and costly production practices through a framework supported by government instituted restrictions. The resultant intra-industry

frictions prohibit co-operative ventures that may remove some of the problems and create an efficient, integrated and competitive terrain.

The monopoly operations are supported by the Legal Notices (43:p.11,26) and red-tape at the Ministry of Commerce and Central Bank which work against imports of competing products. This protection has created a component sector whose products are deemed by local motorists as of poor quality, expensive and often unavailable (43:p.11).

KAM complains that component parts imports "cheat the government of duty and sales tax because customs officials cannot physically count each and every item in a container" (44:p.10). The reality, however, is that imports are cheap and foreign exchange allocations based on domestic prices results in greater quantities of imports than anticipated during the currency allocation. This is what "floods the market with cheap imports" (19).

The sector suffers from international currency fluctuations and **transfer pricing** strategies of MNCs against which it was intended to protect the rest of the motor industry. For example, Luseno (52:p.10) reported that between 1986 and 1988, the cost of components rose by 30 per cent, and that of electricity by 80 per cent. As a result, and despite a government duty and tax reduction from 100 per cent to 85 per cent, GMK still raised the price of its

locally assembled **Isuzu-Uhuru.** Government's efforts aimed at reducing show-room prices cannot be transferred under current arrangements. The core of this trade remains outside of national influence. This is the reality of this industry. It has not developed in a manner sensitive to national needs.

The informed view is that it is a successful components sector that offers the most realistic avenue for LDCs to gain competitive entry into the global motor industry (7:p.32). The reason is that enormous and risky investment is required for full scale motor manufacturing. This is difficult to come by at this time of restricted borrowing options. Secondly, limitations on availability of public capital calls for an option capable of attracting joint venture private funds (local and foreign). This means an option with export prospects. Components production offers the best export prospects. Thirdly, components production consists of a wide spectrum of manufacturing activities that can open up opportunities for an under-industrialised country. It allows countries and entrepreneurs with different levels of technological sophistication to find and develop a niche. This is the spirit of "progressive development" that the authors of Kenya's motor industry envisioned in 1974. However, they chose an inappropriate route and wrong partners.

O'Brien (7:p.32) points out that in seeking a competitive niche in components, differences are only in specifics of participation. An

advanced country, for example, would sell more to domestic and foreign users, rely more on technological collaboration rather than simple contracts, have a broader mix of domestic and foreign capital, and larger firms. But a country like Kenya could create a sector tied to two or three export markets where its source of contracts is located and use that to build capability to compete in the wider components trade.

O'Brien suggests that the emphasis should be on entering and staying on the global stage. This is the way to ensure maintenance of high quality standards through the pressure of open competition. It is also the avenue that addresses balance of payments. A focus on domestic markets conceals inefficiencies that eventually become difficult to identify and costly in subsidies. He predicts that maximum benefits do not depend on a complete domestic motor industry, but on an ability to respond to, and take advantage of developments, quickly. This favours small operations. But widening operations is realistically attainable under such a framework.

These proposals contradict the present operation of Kenya's motor industry and the remedies suggested by KMI. But they do not contradict the national car ideal. In fact, O'Brien proposal is a realistic avenue for "progressively" pursuing the national car ideal. In this direction, the arrival of Mitsubishi on the Kenya scene is potentially beneficial, depending on the terms negotiated

and how informed the negotiators are. Japanese corporations show a marked inclination to contract components production to supplier/partners in LDCs. But Mitsubishi would also injects new experiences, knowledge and expertise to this closed terrain dominated by commercial posturing and opacity. This could improve the quality of discussions and debate towards advancing the national car programme.

Progress will depend on the policy framework adopted. A scheduled master-plan, for instance, even if tentative, could better inform future negotiations, agreements and proposals than nothing at all. This could nurture an institutional culture of preparation and information seeking before negotiations in government, and symbiotic and synergistic co-operation in this industry.

5.2.2 Assembly Technology and Local Capability

Local assembly modifications include **heavy-duty suspension ratings** (29:p.15). The vehicles are also given **extra spot welds, body and mounting reinforcements, underbody protection, "tropicalised" painting**, larger fuel tanks and radiators, lowered diff gearing, and **dust proofing.** These considerations address local peculiarities.

But assembly operates under technological constraints. This is partly because of the peripheral nature of assembly technology and partly because of the way it was set up in Kenya. AVA illustrates

some of these constraints and how they could affect support for the national car. As indicated, AVA is a victim of a national error in selection of partnership. This shows in the direction of its development.

AVA reports that its vehicles contain "45 per cent local value" (not local content) (53:p.47) and that it keeps abreast of developments worldwide (49:p.19). It claims collaboration with overseas vehicle manufacturers in building and developing "vehicles for them" (54:p.48) and boasts "the widest range of models of any assembly plant in the world" (49:p.19). The claims are exaggerated and difficult to verify. Developments at AVA do not support the claims. For example, in 1987, AVA reported attaining a mid-term target of 50 per cent local value-added "with models incorporating up to 30 locally manufactured components" (54:p.49). These levels were unchanged in 1990 (15). The only credible claim is that its **assembly charges have dropped to 7 per cent** of each vehicle's tax free price, down from 15 per cent at inception (54:p.49).

AVA claims to build "only those vehicles that are most suitable for Kenya from the widest possible range" (49:p.19). However, selection decisions actually rest with importers and franchise holders and not AVA. The terms of contract of AVA do not give it the decision making claimed. The **Contract Agreement** (55) underlines the restrictions on AVA and confirms that AVA was not, at inception, intended to develop beyond its current state. For

AVA to evolve technologically the Agreement needs to be amended. The Agreement underlines the authority and control of the importer (who in Kenya is also the distribution franchise holder). Under the Agreement AVA is restricted to working only on what is made available and to undertake no changes without authorisation from the importer.

The **warranty provisions** (55:p.2) confirm that it is the conditions of source manufacturers or importers that define levels of local content and not the views of AVA. But it is only the latter that can evaluate the quality of workmanship of the components sector. This contradicts the picture conveyed by both AVA and KMI who attempt to give the impression that local content decisions are made locally. In the Agreement, '**items** of local manufacture', defined as "parts and components locally manufactured or obtained" (55:p.7), must be approved directly by source manufacturer. This condition imposes operational and material input selection restrictions on AVA. It cannot nurture innovative tendencies or learning in AVA. The franchise holder only contracts local components manufacturers to supply materials after the approval of the source manufacturers (55:p.8). AVA has no input in the decision process.

In this arrangement, the only party that can realistically help develop and nurture local components manufacturing is the importer, not AVA. But importers have neither the technical expertise nor

the incentive to do this. They are foreign owned trade concerns with very wide and unspecialised portfolios. This kind of corporate profile is unsuitable for a partnership expected to nurture and transfer specialist technology and practices.

AVA does not give warranties on parts and components of local manufacture. It only negotiates on behalf of the importer with local suppliers (except in respect of tyres and batteries, supplied by multinationals Firestone and Chloride respectively). This arrangement discourages assembly from increasing levels and use of local parts. The result is the struggle to minimize local content. In this the interests of AVA have been contrived to coincide with those of source manufacturers and franchise holders who prefer to import all components from original sources (14). However, when foreign exchange becomes unavailable, it becomes a trap.

AVA serves to stultify local component development. It demands of its components suppliers acceptance of inspection from representatives of manufacturers and importers (55:p.11). This way AVA prevents direct dealings and subjects the suppliers to AVA's restrictive terms of operation. The restraints on AVA are thus extended to local components who are refrained from searching for alternative process and production methods without risking loss of custom. It also refrains them from independently seeking out, negotiating with, and being directly contracted by competing source manufacturers.

O'Brien's (17:p.7) study of components sector growth in LDCs argues against this kind of arrangement. He forecasts growth of this sector only in an arrangement in which LDC components producers collaborate directly with manufacturers with the aim of supplying their global requirements. The intermediary presence of AVA locks-in and restricts components suppliers to AVA's already restricted domestic market needs. This confined role stultifies potential because no manufacturer would subject global strategy to the needs of a small Kenya assembly operation like AVA. The intermediary intervention of AVA is a bottleneck that prevents the sector from entering the real arena of components activity.

O'Brien points to a trend away from in-house production of components by major vehicle manufacturers. They are opting for collaboration with independent component manufacturers across the world. The specialised operations are better able to take advantage of new technologies, materials and processes. This development is referred to in the industry as "responsibility transfer". It is difficult to see how Kenya's component suppliers can enter this "new wave" of "long-term buyer-seller collaboration relationship" with vehicle manufacturers if AVA is allowed to retain its current role, structure and operations.

If the component sector is to grow, it needs to develop direct links with franchise holders and source manufacturers. Relations transacted through AVA hinder, rather than improve, the link. As

AVA strengthens its role as intermediary, it obstructs this possibility. This undermines the potential development of the whole national motor industry while giving AVA the illusion of a major player. The reality, however, is that assembly is made up of peripheral technological skills. Only improved links between manufacturers and local component producers could build the required technological skills.

The Agreement was designed in a way that restricts avenues for growth of the local components sector. Neither the importer/franchise holder or AVA are, for example, liable for delays or quality failures of local components imposed on them by Legal Notices (55:p.8). This liability limitation implies reservations about the quality of workmanship of local manufacturers and the intention to avoid rather than remedy it. It has led a situation in which increased local content levels would create risks and exposure for which no party is accountable. This makes it commercially unadvisable to increase local content without first amending the Agreement and allocating responsibility and liability over local components. As it is, the Agreement makes it in the commercial interest of AVA and franchise holders-importers to keep local content to minimum, or, as recent trends have shown, remove it altogether if possible. These commercial interests do not, however, serve the cause of improved technological capability and would prevent the realisation of the national car programme which requires a reliable components sector.

This disjointed framework for managing local components contrasts sharply with the stringent requirements, instant reviews and reportage procedures required in handling imported components (58:p.9). By not building an established documented system of quality testing and reporting on local components, AVA practices prevent component firms from gathering data and information on which to improve products. It withholds from the component sector the avenue and opportunity for learning. It allows AVA and its franchise holder partners to make arbitrary quality complaints without giving the suppliers the means to verify them (19). This creates an environment that is unpredictable, uncertain and arbitrary. This contributes to the reluctance of the sector to invest capital in quality and competitiveness and to opt for short-term political intrigue (19,37).

This system has successfully obstructed the technological development of components. It has nurtured a politicised sector in which entrepreneurs invest time, effort and resources, scheming to get their products listed and kept on Legal Notice 22, instead of investing in improving technology and workmanship (39). The result is that this sector produces goods that cannot be exported and remains weak and vulnerable. It is unable to take advantage of the sectoral openings created by global re-organisations in the motor industry and cannot support the realisation of the national car.

A terrain study by NCP should have sought to explore ways in which

the local component sector could be strengthened and integrated with assembly. The national car will be more dependent on this than the foreign models assembled locally. Only a successful, competitive and quality conscious local component sector would give the national car competitiveness. For this, it requires an expanding assembly and services sector and export opportunities.

The absence of an objective study of the area in NCP reports (6,13) creates serious knowledge gaps. This undermines the credibility of the projections for the next phase of the Programme. Lack of confidence in these projections could undermine the prospects for informed investment in this national undertaking.

Current AVA operations do not demand skills improvement. This static arrangement has prevented the development of capabilities that could have been transferred and benefited the national car. Source manufacturers supply kits and standards, define levels of local component inputs, set warranties, and decide whether AVA is capable of meeting the requirements (55:p.2). Source manufacturers also set up the jigs and assembly procedures to be followed (15). The manufacturers supply the experts and demonstrate the processes in sufficient detail for AVA to repeat. They do this at their own cost (15). Only then is AVA is required to commence production.

AVA is not allowed to attempt innovative approaches or adaptations

and must adhere to the arrangements through the life of the model (15). Specifications, technical information, assistance, tools and equipment come from source manufacturers. The importer provides any required specialist training for AVA personnel (55:p.5). All major technical decisions are out of the sphere of influence of AVA (55:p.2). These self-imposed restrictions are reflected in the cadre of manpower at AVA.

The skills training from source manufacturers is equipment specific and used for their models only. It is adopted the assembly standard for the model. AVA's assembly technology has, therefore, become a "mixed bag" (14) because of the varying requirements of manufacturers and the demand for short runs on their models. Qualifications at AVA are thus "on the job acquired skills" (15). Such skill and knowledge is difficult to transfer. This is reflected in the minimal growth of core motor vehicle technological capability in Kenya (14). It is, however, transferable capability that a national car programme requires. It is such skills that could be deployed, for instance, in independent production of kits for the national car.

Kenya's assembly plants have not attempted to manufacture kits because the franchise is held outside core assembly business. The sector has not, therefore, been required to develop the required capabilities. There are doubts, thus, about whether the national car can source kits locally (14). Without this, it would be

necessary to set up a costly comprehensive in-house production facility. This would further undermine price competitiveness.

The AVA **Board of Directors** is also not constituted for effective use of technical expert knowledge in decision making. Its representation includes the Permanent Secretary of the Treasury, two representatives each from the Industrial Development Bank, Lonrho and Marshalls and the Managing Director of AVA - a total of **8 Board members**. No one is required to have relevant technical knowledge. The Managing Director, for example, previously operated **Hughes Limited**, a family run **Ford** distribution franchise. He has no engineering qualifications or previous assembly or vehicle production experience (14,15). AVA's production manager is a motor rally enthusiast, and this appears to be the only relevant qualification for this expatriate who also doubles as deputy managing director (13,14). There is no qualified engineer at AVA (14,15). AVA, therefore, suffers a dearth of relevant technical *expertise*.

There is no comprehensive motor vehicle engineering expertise at AVA. AVA does not employ a qualified engineer and none in management has related qualifications (15). It has been pointed out that assembly requires little engineering knowledge. But to prepare for, and manage, change and build required sophistication demands more capability than currently located at AVA (14,15).

The AVA operations are not well documented. For instance, AVA has no documented projections (15). It also has no formal system of responding to **National Development Plans** or government projections. The organisation keeps no projection records or a master-plan (15). It merely reacts to foreign exchange availability and import licence allocations. But events defined by government planning affect importers through licence allocations, and, indirectly, also affect AVA. However, the plant has no formal mechanisms in place for monitoring or interpreting trends.

AVA runs on very limited levels of diffused information and knowledge or corporate intelligence. Most members of management are unaware of corporate plans (15). Most information is vested with the managing director who has used his franchise experience to diversify and expand AVA's model portfolio (15). But no one else in management can suggest when and how this portfolio is intended to develop (15). This makes the management pattern opaque and shrouds the managing director in mystery. It is not an environment that nurtures learning and participation. In any case the push for model diversity is working against capability building. Capability building requires specialisation at the stage of nurturing. It is difficult to see how AVA defines its role in national capability building and especially with the advent of the national car. The plant operations remain unchanged and the corporate environment has not responded to the development.

The structure of AVA and its operations do not support a proactive and participative corporate posture. But a goverment owned enterprise created to advance technology transfer in a developing country requires a participative management and a diffused system of information and knowledge. This is its justification as a focus of training and a forum for generating technological spin-offs in the economy. But AVA management style is static. For example, according to the Agreement, AVA is not liable for any delays or defects caused by the absence of specifications or technical information that should be supplied to it from source manufacturers. This gives the plant no incentive to develop plant specific innovations required to enhance operations, reduce costs and address local peculiarities. It is difficult to see how any learning can take place within such operational framework.

All AVA is required to provide are facilities, general production equipment and employees to achieve and maintain production schedules in accordance with pre-determined and demonstrated standards of quality and volumes (55:p.4). This does not argue for a rationalised system of operations. For example, most tools and equipment supplied by the importer, remain the property of the importer, and are used exclusively in the assembly of the importer's vehicles and returned on termination of Agreement. The result is duplications in tools, equipment, procedures and standards. This does not advance staff learning especially with the cadre of staff at AVA who re not required to have formal

theoretical training. The skills accumulated become patchy and difficult to transfer. AVA is, therefore, unlikely to have much technical information and expertise on site to advise Nyayo Motors.

AVA is committed by Agreement to safeguard all information, trade and production secrets it may learn and to prevent its transfer to any other party. This covers drawings, plans and specifications (55:p.15). AVA undertakes not to use the information even after termination of Agreement. This prohibition has no time limit. AVA is also committed to return all documents, and copies, at the end of its contract. These are excessively prohibiting clauses that would prevent AVA from constructively advising Nyayo Motors Corporation.

AVA was designed for a closed arrangement that supports a network of importer-franchise-distribution oligopolies. This straight-jacket could stifle a new concept like the national car. But AVA actively supports this status quo and participates in obstructing institutional understanding of the motor trade. As a government owned operation, AVA illustrates the dangers inherent in uninformed government investment decisions and poor institutional terrain management.

It is apparent that the priority of the franchise holders who conceived AVA was to benefit from the privilege of making revenue from assembly. Improving capability or advancing the technological

cause of Kenya's motor industry was not. AVA cannot, therefore, constructively support the national car under present arrangements. For example, the Agreement commits AVA to side with franchise holders in any negotiations with the government and local component suppliers (55:p.15). This undertaking forces AVA to support the interests of Lonrho and Marshalls if these conflict with the aims of the national car.

It is strange that the government undertook to finance this arrangement to the extent it did and that it has not sought amendments sixteen years later. It underlines the depth of limited institutional understanding of this sector. This should have constituted one of NCP's priority studies. It is difficult to see how a credible programme of a national car could be drawn up without this knowledge.

AVA's picture is replicated in the two other assemblies. But these operations are even more restricted because they were conceived as dedicated assemblies. No partner in Kenya's assembly has competitive credentials in international vehicle manufacturing. Even Leyland and GM have no credentials to transfer. These organisations could not be expected to transfer the best working practices to the sector, let alone competitive technology to the country. GMK, for instance, admits to "steadily losing market share to the Japanese and to Ford" (56:p.29) despite its collaboration with Japanese vehicle manufacturers. It admits failure to identify the source of this problem. GMK's Managing

Director ascribes Japanese competitiveness to "plant management and union relationships, cultural differences in the way they run their businesses, and product offerings". Kenya's assembly partners cannot give the country the lead it needs. A young terrain requires the guidance of dynamic and innovative corporations if it is to navigate a successful path.

In Kenya's assembly sector, selection of partnership was not appropriate. The whole motor industry needs the injection of more dynamism and competitive spirit. In this the arrival of **Mitsubishi Corporation** is probably the most positive development in the industry since 1974. But the sector also needs greater transparency to make future entry for others easier and to eliminate the culture of obstruction. A six year study by NCP should have raised the level of sectoral transparency and built corporate profiles of operators. This was not addressed. But the success of the next phase requires it.

The culture of complacency is entrenched in the industry. This explains the predominance of franchise distribution instead of technology licensing to manufacture parts and components. An official at the Chamber of Commerce and Industry (37) explains that licenses are more demanding to administer and require a capability that Kenyan enterprises have not been given the incentive to build. What is more, the dangers and costs of infringing patents and licences are higher. Franchising is thus indicative of limited

technological and entrepreneurship sophistication in the industry and country.

But the basic information required to start the exercise of improving institutional understanding of this sector resides with organisations in the industry. Their experiences is an important input in decisions on how to design and introduce the national car to the Kenya market. Their experiences, problems, proposals and solutions offer a good basis for beginning and building informed discussions, negotiations and decisions.

5.2.3 The Motor Trade and the National Car

The motor trade does not use local research resources and results *(6,27)*. *Assembly* plants do not, for instance, turn to Kenya's centres of research for potential solutions when faced with technical problems (14,19,37). They use equipment dealers who operate parts and service maintenance contracts. But these are local agents of MNCs who turn to the mother company in cases of complications. But complications are rare because operations are mainly service and replacement (14).

This is the set up that surrounded NCP. AVA was involved in the early stages of NCP but was forced to leave because of "poor communication" between it and, particulary, the Nairobi University Team (15) which was coordinating the exercise. AVA complained that its contributions, and presence, were not being acknowledged in

official records of the Project (14,15). No explanation was given. But even after departure, AVA kept an active interest in progress of NCP (15). The assemblers association, KVMA, also closely monitored developments of the sector (14).

GMK reports "neither being approached or consulted" over NCP. But it expressed a willingness to link up with the Project (56:p.29). KVM was not approached (13), nor was KVMA, as an association. KMI reports that its membership is supportive of the "Kenya vehicle logic" (6) and that the industry, in general, and assembly, in particular, is committed to the idea of "progressive manufacture". KMI argues that local assembly has been "moving steadily towards a **wholly Kenyan vehicle**" and that local industry "lacks neither the inclination nor the capability to progress along this line". KMI asks for "political and economic chance" to pursue this ideal. It reports that individual members **"repeatedly offered assistance and co-operation"** to NCP but were snubbed (6).

AVA claims that other NCP members became hostile because of the questions it raised. These included, for example, "why it was thought necessary to spend months recreating a starter motor when one already existed and especially if it was not intended to make major changes or innovations to the item" (15). But "re-creating the wheel" seemed the centre-pin of NCP philosophy (15).

AVA also raised issues about the cost implications of "re-creation"

in relation to prevailing show-room prices. Competing models accessed the latest and cheapest technology. But Nyayo cars would require a completely new infrastructure of parts and technology suppliers if the path of "re-creation" was followed. They also pointed out that the supportive back-up for the Nyayo cars could prove a problem because of the absence of a comprehensive and competitive national components infrastructure. This point was also raised by another institutional representative who called for an in-depth study of this particular sector (132). But the matter was not followed up. In any case, the Team found AVA representation "obstructive to progress" and invitations ceased (13).

It has been suggested that NCP would have gained little from the from the participation of the local motor trade (57). It has also been suggested that the national car was a threat to existing arrangements and that the sector could have sabotaged it. A government official opined that "ideas created by the Team" could have been stolen by representatives of the local motor industry (57). However, the indications are that the outdated replications in which NCP indulged would not have been of benefit to this sector's commercial interests aimed at satisfying a market sharply inclined towards currency (6). In any case turning ideas to products is an undertaking this industry has no experience of and has not developed the forum for.

It has also been suggested that the technical expertise of the industry was not relevant (13). KMI (58:p.20) lists these skills as including "high quality welding, metal finish, metal pre-treatment, spray painting, precision tool construction and maintenance, motor vehicle mechanics, engineering and repairs, clerical, administrative and salesmanship". These are not necessarily motor vehicle specific skills and they were obtainable among the other participating institutions. But it is inconceivable that this sector did not possess insights unknown to the Team. In any case, their presence could have aided efforts to isolate and specify sectoral weaknesses. This is important because the industry does no publish true accounts of its state.

The absence of the industry contributed to NCP weaknesses in niche-targeting. NCP reports do not indicate **specialised or outstanding qualities** emphasised or local advantages expected to accrue from realisation of the Project to, for example, the local component sector. Nor do reports specify weaknesses the national car is to address. In failing to tap the only locally available source of, albeit limited, expertise, the Team was unable to comprehensively define the problem at issue. This weakened the search for solutions. The NCP reports carry no inventory of locally available expertise, do not take account of, or acknowledge, any previous studies of this sector (59), and fail to specify trends in the motor industry that made NCP necessary. To effectively inform its decision process, the Team needed an information reconnaissance and

processing back-up. It had none (13).

Membership of KMI includes importers, service and sales agents, assemblers, local component manufacturers, ancillary services (63:p.34) and "leading insurance and finance companies with substantial motor business interests (47:p.1). Such diversity is a good source of industry information. But it has short comings. It has yet to build a data bank that would inform the sector and eliminate the commercial posturing that makes it opaque. KMI has argued for studies to enhance terrain transparency. Its ideas and opinions could remove the need for preliminary surveys required to inform preparations.

It is not structured to address and lead change. Its **Executive Council** is, for instance, designed for a permanent over-representation by importers and assemblers (64:p.3). These are, however, interests at the periphery of the core technological activity that this industry needs to develop. They are the very interests that have driven the sector into its current state. KMI's decision making machinery is dominated by chief executives of these organisations. But they are foreigners on temporary postings and unlikely to develop the required depth of familiarity to lead the sector (64:p.3,37). It is difficult to see how KMI can effectively address the national dimensions of the industry with such an in-built bias. Pursuing goals that favour current KMI interests would not, therefore, advance the cause of a national

car.

KMI has **Technical Committees** that represent all sectors of the industry and address specialist matters. But it admits that local componentry has a marginal profile in its operations (47:p.2). Since local componentry has been identified as the core framework for a viable and competitive motor industry in Kenya (7:p.32,52:p.44), KMI cannot be expected to adopt a constructive stand in relation to the national car without the informed intervention of relevant departments of government.

Informed intervention is legitimate because of government equity in assembly and as an environment enabler. But its effectiveness will depend on instituting of alternative mechanisms to improve sectoral transparency. Such mechanisms could, for example, involve creating affiliated, but parallel, indigenous technology building institutions. These would help build an impartial picture of the industry and improve government institutional knowledge and decision making processes on it. This is crucial for success of the national car programme. An example of such a parallel impartial institution would be an affiliated technology or policy analysis centre at one of the public universities with a membership in KMI or one of its affiliates. This would serve as a bridge between the industry, the national enabling institutions and the economy.

This bridging is important because KMI has not set up a technology research and development portfolio despite the entrenched sectoral problems. Like other MNC dominated sectors, leadership of KMI prefers to import solutions. This system prevents the development of indigenous technological capability and weakens national understanding of the industry. Local relevant research could activate the participation of national institutions and emphasise the importance of components development to the industry. Only a study focusing on the development of the national industry can reach such a conclusion. Currently KMI conclusions are a summation of corporate interests that address the wrong sectors of the industry.

Constructive proposals can only arise from a broad-based dialogue. Exclusion of the motor trade prevented the evolution and development of such a dialogue. KMI can bring crucial industry insights into the dialogue. KMI statements already help isolate some problems. Actively seeking views on the industry would have informed discussions by NCP teams.

For instance, KMI reports that **"there are no specific and official figures on the national fleet size or model mix"** and that its own figures are estimates based on **"street observations"** (65:p.19). It admits that market figures are difficult to reconcile because a large proportion of vehicle registrations occurs outside the formal motor industry and because figures are distorted by **commercial**

posturing.

But KMI figures are the only ones available. This raises questions about NCP assumptions on, for example, the state of the market, as based on KMI figures. It casts doubts on the institutional competence and foresight that introduced assembly into Kenya's motor trade. It raises doubts about the credibility of government policy statements based on KMI data. It suggests an absence of a defined vision or master-plan for the industry. A master-plan would have required the instituting of mechanisms to monitor progress and development. Such measures would have included the need for creating and building the ability to gather and interpret data on the industry.

This observation indicates that the National Car Project was not *conceived as a "progression"* from assembly and intended to integrate the industry. It appears to have been the product of a *coincidence between* an unanticipated presidential challenge and the availability of uncommitted funds. An informed dialogue would have suggested the need to set up a framework and mechanism for improving understanding of the sector and designing its development within the framework of a national car. As it is, NCP reports do not show this inclination. The role of institutions as environment enablers cannot be effectively and competently carried out in such an environment.

The need for information gathering and processing back-up was lost on NCP. Coupled with insularity and secrecy, it prevented progressive learning. For example, there were media reports on concurrent programmes in Africa (60:p.10,61:p.71,62:p.28). Yet no NCP report acknowledges this. It ignored previous studies of Kenya's motor industry (59). What is more, lessons from neighbouring Tanzania gained from their pursuit of a **"national lorry"** and **"national tractor"** (14) were not made known to NCP (13). NCP did not scour the region to apprise itself of related activities, experiences and lessons. The process of "re-inventing the wheel" was decided on and pursued without the benefit of existing stocks of information, knowledge and experiences. The absence of information processing capacity and use in NCP led to institutional insensitivity to stimulus.

5.2.4 Parallel Related Activities

NCP reports confirm a disregard for parallel activities that are a learning opportunity and the means to gather information on possible competition. This attitude disregarded Kenya's recent experiences, including attempts by neighbouring countries to qualify Kenya's entry into the **Preferential Trade Area** (PTA) Agreement. These countries have demanded clauses that restrict duty-free movement of goods made by MNCs located in Kenya for fear these may smother regional efforts to nurture indigenous firms. These clauses require that duty free facility be accorded only to firms with local majority equity or to goods with levels of local

content often above those attained by most "made in Kenya" products.

These are determined moves to prevent unequal developments in the region. They are anticipatory and indicate an under-current of rivalry. A programme like NCP, with its decidedly PTA-focused overtones, needed to build capability for monitoring competitive events and reading the mood in the region.

This is important because economic strategies appear simultaneously in sub-Saharan Africa. For instance, plans to set up **Export Processing Zones** (EPZ), **Manufacturing-Under-Bond** (MUB), **One-Stop-Shop** licensing and capital markets (66:p.70,154-8) feature in Development Plan documents from Kenya, Zambia, Zimbabwe, Ghana, Nigeria and others. The reason for this is that Africa gets ideas, advisors, packaged solutions and funding from similar sources, institutions and countries. This leads to concurrences of ideas and programmes. An awareness of developments in the region is an important and immediate source of information on lessons and experiences.

What is more, what appears as "new" in the region's development plans will have already been operational somewhere else. For instance, EPZs have been in South America, the Far-East and the Indian Ocean islands since the 1960s. Ironically, they are gaining currency in Africa when other regions are becoming disillusioned

with them. The MNCs that EPZs are designed to attract are re-locating production in developed countries because cheap labour is becoming less important in the production equation because of technological and organisational changes. What is more, even at the height of popularity, EPZs had structural problems (67:p.107) not currently referred to in the African plans. In any case the indications are that the flow of investments is away from this region and towards the Far-East. These complications cannot be addressed by the introduction of old initiatives. However, EPZs are being presented as novel means of diversifying economies, earning foreign currency, gaining technological capability and reversing economic decline. It would, therefore, have been strange for the idea of a national car to dawn only on Kenya. In any case, the idea is not, in itself, new and has been pursued in various ways by LDCs since the 1950s.

It was reported in **January 1990** that Nigeria had removed the obstacle to a **"wholly made-in-Nigeria car"** by building **an engine block** locally (60:p.10). **Olympic Technical Works**, a parts manufacturer, had sourced required **"raw materials locally"**. Olympic, formed in 1987 and based in Anambra State, boasted one of the largest foundry and machine shops in West Africa, laboratory facilities of international standing, and specialised in spare parts production. Olympic built the engine for **Volkswagen Nigeria Limited.**

The engine was a product of coordinated effort. The work was supported by **Projects Development Authority** in **Enugu**, the **Ministry of Trade and Industries**, the **Raw Materials Research Council**, and by research programmes at the universities of **Nigeria-Nsukka**, **Benin** and **Ahmadu Bello**. It showed links between national research and industry which is absent in Kenya.

In February 1988, the **Ministry of Industry** gave **N.500,000** to the **Project Development Institute** (**Proda**) to be used in developing a **prototype** of a **four-wheel drive** (4-WD) vehicle for use in rural communities and urban centres (68:p.34) and to be ready by **December 1989**. The "made-in-Nigeria" 4-WD vehicle was demonstrated in public at the **Science and Technology Exhibition Week** in **Lagos** in **March 1990**. It cost **N.700,000** to build, had a **net weight of 450 kilograms**, a **gross weight of 1,000 kilograms** and was capable of doing **100 kph**. The pre-production model was expected to be an improvement on the prototype. The deadline was adequately achieved.

The prototype was faulted for having small tyres, low headroom, a crude steel roof, low ground clearance, a fuel tank located directly under back-seat, a heavy net weight, and questionable silencing (68:p.34). The Project Team complained of shortage of tools, inadequate staff, lack of raw materials, inadequate flow of funds, **lack of technical information**, and "lack of exposure to **modern automotive technologies**". A technician referred to

"occasions on which they had to bend metal with bare hands" (68:p.34).

It was suggested that the design was determined by cost and show-room prices set at between N15-20,000. The Team explained of having to apply engineering to cost in order to design something within the price range. This is what made "the vehicle short horizontally and high vertically" (68:p.35). It was emphasised that "most developed nations whose products we admire today, and rush to buy at the expense of others, had humble beginnings" (68:p.34). This was an appeal for patriotism.

The prototype **had a local content between 65 - 75 per cent** which the Team considered appreciable since **"some vehicles in developed nations have less than 40 per cent local input"** (68:p.35). Local content included **arrangement of body system, design of drive arrangement, front-wheel drive, springs and suspension, brake system, steering mechanism, exhaust, transmission, fuel line** and **clutch.** A **Fiat 126 23-horsepower engine** was bought-in and "modified to requirements".

Commercial production was intended to reach **500 cars a day** for a national demand estimated at **100,000 per year** (Table 1 and 2). It was estimated that, when operational, the plant would employ a workforce of about **75,000** (68:p.35).

There are similarities and differences between this Nigerian

project and NCP. Both were politically, not commercially, initiated. But the Nigerian project shows a deliberated and considered approach to implementation. It was launched at a scientific forum and the Team had rational answers to criticisms. It had deadlines and fixed costs which shaped decisions. For example, having to buy-in the engine was a cost and price influenced decision. The cost of developing a new engine to be produced in limited quantities for the domestic market would have pushed up the price of the final product. This showed greater commercial realism than NCP. Producing 3,000 engines annually for the Nyayo cars would push unit costs of the vehicles well above US$7,000.

This project also paid attention to the future direction and phase of the programme. On-going work to complete the pre-production prototype that accommodated criticisms was announced. But NCP remained politicised and secretive and responsibilities were not clearly allocated. The Nigeria project addressed production plant requirements. The NCP reports did not. They achieved within a time span of two years what NCP could not accomplish in six years. This project also underlined the superfluous nature of NCP's extra prototypes and the failure of NCP to address production requirements.

But the Nigerian project also showed weaknesses. Why, for instance, was the experience and facilities used by Olympic not

used here? Was it necessary for the Team to "bend metal with bare hands" when **Olympic Technical Works**, and probably other firms, boasted modern facilities (60:p.10)? And why was the Olympic's Volkswagen engine not used to save on the costs of having to "modify" the Fiat 126?

This Team only considered the facilities on site. They did not search widely for expertise, facilities and information - locally or regionally. A national project should, however, be an occasion to evaluate national facilities, institutions and skills.

Like NCP, this Team makes no reference to concurrent activities in neighbouring countries and does not try to pool such experiences. This contributed to some of the project weaknesses. For example, complaints of lack of information and exposure to automotive technologies are vague. Such gaps can be bridged by co-opting or buying-in requirements. It is particularly strange because Africa has, over many years now, put in place institutions intended to administer science and technology information exchange, including the OAU-UNECA established **African Regional Centre for Technology** (ARCT), located in Dakar, Senegal.

With a membership of over 30 states, including Kenya and Nigeria, ARCT runs **Technological Consultancy and Advisory Services** and **Information and Documentation** Divisions to which members can refer. These Divisions monitor new global and regional technological developments and activities and make observations and

interpretations available on request. ARCT collects industrial and technical information from a wide catchment area and carries out global state-of-the-art searches when asked to. Expert joint facilities and institutions like ARCT are costly and are intended for use by such projects. This also helps diagnose weaknesses in the facilities and improves their performance.

Zimbabwe adopted a different approach. In 1989, it launched a collaboration project with the Japanese **Mazda Corporation**. Mazda boasts partnerships with the US Ford Corporation and is involved in a joint venture with Kia Motors in Korea to produce the new concept **500-800 cc engine minicar** aimed at low income LDC consumers (8:p.52). Mazda was, therefore, bringing to Zimbabwe useful collaboration experience with large and small vehicle operators. This knowledge enriched Zimbabwe's efforts and influenced the definition of its programme.

The project was a tripartite venture agreement between **Mazda**, the Japanese trading firm **C Itoh** and **Willowvale Motor Industries** (WMI), Zimbabwe's motor vehicle assembler (62:p.23). It involved **Zimbabwe $5 million (US$2.5 million)** investment from Mazda and Itoh to strengthen Willowvale's manufacturing base. It also involved **technology transfer** arrangements through which Willowvale would **increase local content from 34 per cent to 62 per cent** over **three years** and reduce its production costs. It also involved **automotive design** and management training for Zimbabwe staff in Japan.

At half the cost and time of NCP and with foreign money, Zimbabwe was to get a ready and marketable product under tutelage of an experienced and reputable partner. In addition, local manpower would be trained in a leading motor vehicle producing location. The Zimbabwe programme included a locally experienced vehicle assembler for whom this would lead to advanced corporate capability. WMI was the focus and location around which to accumulate expertise and experiences.

These dimensions are missing in Nigeria and Kenya programmes. They are the kind of considerations that arise from having the input of motor vehicle industrialists in such a project. Both Kenya and Nigeria projects excluded industrial input and gave the responsibility for realising the projects to an **ad hoc grouping** whose loyalty and accountability lay with their permanent employers. What is more, Kenya and Nigeria programmes did not seriously address motor industry training. This was a serious oversight.

The priority in Zimbabwe was to set up an **engine and transmission assembly** operation at WMI and gradually phase-in more locally manufactured engines parts. The second phase was to set up a press shop at WMI's subsidiary, **Deven Engineering**, to press non-critical body and chassis parts like floor pressing, reinforcing panels and the chassis itself. As technological expertise improved, more sophisticated pressings would follow. Running parallel was another

project to make electrical wiring harnesses. Time-tabling was emphasised, unlike NCP, and **"all was to be in place in three years"** (62:p.23). As argued before, time-specificity advances performance, supports objective reviews and ensures accountability.

The Zimbabwe programme also recognised the value of a successful components sector. To develop expertise in local component manufacturing, Mazda agreed to extend the life of its current models in Zimbabwe. This was to allow local component manufacturers to **tool up,** provide spares competitively locally and gain the necessary experience through specialisation. In Kenya, local component development was never considered nor was the centrality of the sector to the success of the programme recognised. Without a focused model to specialise in and sharpen skills through adequate economies of scale, investment in equipment and skills is difficult to attract and encourage.

Zimbabwe illustrates exhaustive preparatory work and realism, a culture lacking in Kenya and Nigeria Projects. Preparatory groundwork involves information gathering and reconnaissance. If exhaustively executed, it enhances terrain transparency and makes subsequent steps easier to plan and undertake. The lack of references by the NCP and Nigeria to local, national, regional or global endeavours and experiences indicates a disregard for such preliminaries and accounts for duplications of efforts and errors. For instance, both suffered design weaknesses. In the case of

Zimbabwe, the presence of an experienced local assembler and international manufacturer bridged the knowledge gap.

Replicating a car should not, in an age of increasingly transparent technology, information and skills exchange, be considered a scientific attainment. India, for instance, produced its first "home-grown car" in 1988, years after independently launching Indiasat, the national satellite, into outer space and confirming its credentials as a leading scientific state (69:p.7). The patriotic rhetoric and claims of NCP were, therefore, inappropriate for a national car programme.

The goal of such projects should be to bring the enterprise successfully into commercial and export markets. A national car offers a potential niche for entering technology-based international commerce, to reduce dependency on commodity trade and to integrate the national industrial base. To attain this calls for objective scientific, technological and commercial considerations to inform decisions. O'Brien (7:p.31) points out that the attraction of the motor industry is in it being a "technological bridge" for commodity-trapped LDC economies. Sectoral bridging and integration is difficult to achieve in an opaque terrain.

The market size and distribution channel which this industry requires can create a basis for export oriented manufacturing

which, if competitive quality is attained, would carry manageable risk. Secondly, the industry permits a mix of techniques which allows a developing country to cash in on low labour costs while opening up a number of avenues for technological learning. Thirdly the scope for pursuing exports in this industry do not contradict a simultaneous pursuit of import substitution in the sub-sectors. And finally, this industry uses a wide range of metalworking skills, closely related to craft skills of LDCs, and is also a pioneer in use of microelectronic skills that define the future. A successful local motor industry will put integrating pressures on sub-sectors while positioning an LDC economy to start manufactured exports.

Pemberton (9:p.16) states that this industry demands a total interdependence and availability of thousands of items at exact moments of need. For it to be successful and competitive, this industry puts pressure for total transparency in acquisition, production, and distribution on most sectors of a country's industrial base. It is for this goal that the national car idea is important in economic and technological terms. But such realities were not accommodated by NCP.

The Nigeria Project brief was specific. It required a 4-WD rural vehicle with a projected price. The NCP brief was not. It only required a 100 per cent Kenya vehicle. However, a technological venture intended for commercial goals requires to bring something

new into the market. This is the basis for its competitive edge.

Statements that point to **"extra-tough"** local assembly products (70:p.15) imply market peculiarity and a potential for niche-targeting. Because Africa produces no vehicles of its own and is a relatively insignificant consumer (7:p.7), it does not generate products ideal for its needs. Local assembly only patches around this inadequacy. But in doing this it helps isolate the niche. In this they have accumulated knowledge that can potentially inform discussions and decisions on the idea of an **African car.** The Zimbabwe programme was better designed to benefit from such stocks of knowledge and information.

The pursuit of an African car is not new. British Leyland's Landrover was designed to address this market in the 1950s (61:p.71). This niche often receives implicit references in reviews of new models. For example, Bennet's (71:p.16) evaluation of a new Honda model in Kenya carried such a message. This model had won reliability surveys in Europe and was a bestseller in the US. But it was found wanting in Kenya on ground clearance, ride height, and suspension. The **double wishbone** system which allows for a lower bonnet line, good looks and aerodynamics and intended to improve handling on smooth roads made the model a "high-speed road grader" in Kenya.

The **Africar Project** is a recent attempt to address this niche and

the skills shortages, poor roads and extreme climates that characterise the African market. It was started by a British-based company, **Africar International**, set up by a British engineer, Tony Howarth, in the early 1980s. Africar aimed to produce a car on low cost, appropriate and readily transferable technology. It was designed to replace the foreign-exchange consuming kit assembly industry common in Africa.

The body and chassis were to be built from plywood-reinforced plastic (**PRP**), a tough, cheap, light-weight and rustproof material. PRP is 30 per cent lighter than steel, 15 per cent lighter than fibre glass, and has a high energy absorption on impact. The mechanical components were to be based on diverse design features ranging from **Model T Ford** to the **1935 Citroen 2CV.**

Howarth's mechanical refinements considered constrains of Africa's motor industry. Therefore, and in order to avoid the foreign exchange costs of licensing components from other companies which would push up manufacturing price, Howard designed and built his own engine, transmission and suspension systems (61:p.71). The PRP chassis frame was made rigid, durable and easily repairable and the galvanised steel components made rustproof.

The engine was designed to be virtually maintenance-free with an air-cooling system designed to accommodate extreme temperatures. It was designed as a modular system, with two and three cylinder

versions that could be tailored to local needs. The suspension system was designed to allow for fast driving over rough ground while maintaining a smooth ride. Africar was offered in ranges from **four-wheel saloons** to **pick-ups**, **six-wheel vans**, and **eight wheel, three tonne trucks** and **tankers.**

It was calculated that production of **5,000 mixed models a year** could save up to **US$30 million year** in foreign exchange as compared to CKD kit assembly. The Africar was expected to retail for **US$6,500** and the **plant to cost around US$20 million** (61:p.71).

Africar addressed a functional niche. The editor of Kenya's **Autonews** argued that it did not address **"the social status functions of the car"** in Africa. He considered it **"admirable but unmarketable", "what Africa needed but not what it wanted"** (61:p.71). Others argued that what Africa needed was "tough utility vehicles for rough roads". This debate points to the complicate nature of niche-targeting and the need for realistic discussions, compromises and informed decisions.

Africa is caught in a trap of **least growth** (9:p.72). To create and achieve the African car requires informed planning and decision making. The region is on a **threshold of car ownership** but lacks a **suitable product.** Local initiatives are trapped by **high units costs and incomes below the threshold required for self-sustaining growth.** The goals is to competitively design a low cost, **low**

technology product. This could open up access to 75 per cent of the world population's **motorised transport needs.** It is efforts to meet this need that characterise the pursuit of the **minicar car idea** now actively explored in India, Korea, Taiwan and Brazil.

The technical and commercial realities need objective considerations. To do this existing lessons need to be taken on board. Zimbabwe opted to be led and nurtured by a successful and experienced company. Kenya believed it could go it alone and collaboration with Mitsubishi only came as an after-thought. In the event NCP spent six years producing prototypes that are unlikely to see commercial production. Zimbabwe's was, therefore, the realistic short-cut.

Africar's conception brought something new on the technology market. It was designed to support technology learning process in countries pursuing a national car ideal. Africar's modular system, for example, allowed for parts of its technology to be purchased in **"unpackaged"** form and re-packaged in the country together with ideas developed there or anywhere else. This was intended to facilitate indigenous technology learning. Not selling Africar as a technological package, as is the prevailing practice, constituted a radical approach to technology sale. It was based on an information concept of a car and its manufacturing process as a package of information. It indicated a new avenue that could commoditise technology trade in the future. It represented the

ideal in technology transactions that LDCs should be striving to attain.

Information on these ventures and institutions could have reduced duplications in literature searches, material testing, market surveys and other activities. It would have removed the need for NCP teams to spend nights re-designing existing tools and processes or for the Nigerian teams having "to bend metals with bare hands". An efficient information search would have revealed cheaper and tested existing alternatives successfully being deployed elsewhere.

It is the need to avoid duplication costs that has led countries with more advanced technological capabilities to avoid the path of independent design and production of "100% home-grown" vehicles by seeking collaboration with established reputable operators. This is the option Zimbabwe took. It is also the option that has nurtured all successful motor industries in LDCs, including Korea and Malaysia. What is more, it is the way the way this industry is globally structured and designed to operate. The NCP approach went against established practice. Unless this was intended, and no evidence to this effect has been given, it suggests problems for the programme. Informed, but drastic, intervention will be required to bring Kenya's national car programme in tune with the realities of this global industry.

5.2.5 The Global Scenario

The global motor industry is dominated by MNCs from Europe, Japan and USA (Tables 4 and 5).

TABLE 4

Regional Shares of World Production of Motor Vehicles (%)

Region	1946	1970	1985
USA	79.2	28.2	26.0
Western Europe	13.4	39.9	28.2
Eastern Europe	2.7	5.1	7.5
Japan	0.4	18.0	27.4
Others	4.3	8.8	10.9
TOTAL	100.0	100.0	100.0

SOURCE Economist Intelligence Unit (9:p.11).

Increased sophistication of the car and competitiveness of markets has led to models being replaced at **shorter cycle times** and increased **development costs to levels not sustainable by single companies.** The result is joint ventures in design and manufacture of major components like **engines** in order to **spread costs.** This has led to increased numbers of **similar vehicles being produced in many countries around the world** (9:p.16) and MNCs owning several marques and using **badge engineering to differentiate products** (9:p.15). As a result, the **Mazda 121** has, for example, been sold in the US as **Ford Festiva** and in Korea as **Kia Pride** because of collaboration between Ford, Mazda and Kia motor corporations. The

Opel Kadette was sold as **Vauxhall Chevette, Maepsy-Na** and as **Isuzu Gemini** in various parts of the world because of collaboration between Opel, GM, Isuzu, and Daewoo. This is the way the reality of the industry.

Product developments now focus on **specific items** like **gearboxes** or body design and allows a particular type or model of component to be installed in more than one manufacturer's product. The increased sales reduces unit costs of such components. **With costs approaching US$1 billion** (1987 figures) **to develop a new vehicle from scratch**, and **US$300-400 million needed for a new engine** alone, the trend is **"collaboration and mutual assistance"** (9:p.16).

These trends contradict the philosophy of technical independence on **NCP** was run. Collaboration and assistance has been forced on the industry by pressures of the market.

TABLE 5

Regional Shares of World Sales of Passenger Cars (%)

Region	1960	1965	1970	1975	1980	1985
North America	58.4	54.1	41.1	36.9	34.4	38.4
Western Europe	29.9	33.3	36.3	34.1	35.3	33.8
Japan	1.2	3.2	10.8	11.1	10.1	9.9
Eastern Europe	2.3	2.2	3.3	6.1	7.1	6.7
Rest of the World	8.2	7.2	8.5	11.8	13.0	11.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE Economist Intelligence Unit (9:p.18)

The annual global sales of cars is over 35 million units. These come from **50 major manufacturers in 20 different countries**, with **widely differing technical and other specifications and in a host of colours.** They are shipped round the world and built from components scheduled **up to 12 months prior to production.** Added to this is the interest on borrowed money used to finance production, distribution and selling. This industry stretches technological and logistics capability. This is what has created demand for cooperation and the need for competent partnerships.
The result is an industry that proactively seeks and uses new ideas. NCP was not proactive. It was not, therefore, designed to cope with the realities of this industry. Further development will require changes in the parties, institutions and procedures followed.

The Economist Intelligence Unit (EIU) (72:p.36) advises LDCs against trying to **build autonomous motor industries** because these would not be viable. It recommends **cooperation** with top-league producers while **keeping a keen eye on possibilities** of exports in both CBU vehicles and components (72:p.36). In components, EIU identify Japanese vehicle producers as showing a greater tendency to transfer responsibility to partners for parts component supplies. But US and European companies are moving in the same direction. Technological advances and cost minimisation pressures are forcing MNCs to rely on creative contributions from specialised component producers. This pattern of devolved responsibility

cannot evolve in Kenya if AVA's type of intermediary role becomes entrenched in the sector.

The complexity of many new components, especially those relying on micro-electronic technology, and the multinationalisation of components firms themselves, is stimulating sharing of responsibilities, and opening up the path for longer term buyer/seller relationships. LDCs are advised to seek a niche amidst these changes and to use local content regulations to persuade local affiliates of foreign producers to increase exports. But the export avenue is closed to Kenya because the firms are incapable of pursuing exports and actively undermine the growth of a competitive component sector.

The EIU approach would lead to a sector able to earn its own foreign exchange and **contribute to balance of payments**, instead of being the drain that Kenya's **import substitution assembly** is. It would create an impetus for inter- and intra-industry linkages and cooperation that would strengthen and upgrade national industrial base. Kenya's motor industry is, however, evolving in the opposite direction. It requires an overhaul to be brought in tune with the realities of the industry. This was not suggested by any of the NCP reports. Neither have KMI studies. KMI's reading of the motor industry has been flawed and subjective.

The EIU survey points out that success is likely to be attained in

a strategy that strives for a foothold overseas while simultaneously widening domestic demand. This contradicts KMI demands for a total and exclusive domestic market for local industry as a prerequisite for successful exports. EIU emphasis is on entering **export markets** through links with successful MNCs which support expansion of parts and CBU production. It would demand improved technology to sustain the export drive and to build a strong base for local content (72:p.52). It points to the need to search for and negotiate beneficial partnerships. This avenue is currently blocked by Kenya's choice of partners.

To get a place on the international motor industry scene will require negotiating agreements acceptable to MNCs. This is only possible if negotiations are founded on realistic ambitions. This depends on LDC governments being informed on the realities of this industry. Although MNCs are likely to be better aware of what is feasible than governments, real success depends on the negotiating capabilities of government institutions. These institutions need a good base of information and knowledge of this industry. Currently, there is very limited institutional information, knowledge and understanding of this sector in Kenya (13,15,27,57). But the best interests of both parties are better served by well negotiated terms that allay future suspicions and doubts.

This EIU survey underlined the importance of effective negotiating capability as the basis for a successful entry into the

international motor industry trade. By inference, a successful national car programme will depend on negotiating capacity in the responsible institutions. This means good institutional information management. This survey argues for beneficial collaboration based on informed negotiations. For export success local skills must keep pace with what is happening in key overseas markets and local product standards need to be comparable. This requires enhanced institutional global technology reconnaissance capability, the acquisition of best quality technology and at the most competitive prices. It argues against the emphasis on second rate manual technologies that dominate Kenya's assembly and components sectors. These technologies increase production costs and undermine price and quality competitiveness. Without this foundation, export strategies cannot be pursued.

The inequality in this industry is illustrated by the insignificance of LDCs in the global production and consumption equation (Table 5). For example, all LDCs contribute about one sixth of Volkswagens global production and about 9 per cent of Fiat's total output. The loss to these MNCs from cutbacks in LDC outputs would be insignificant. This is even less in other MNCs. The continued MNC presence is based on the long term notion that LDCs represent a demand potential for the future. But to LDCs these operations are of vital economic significance, even assembly activity.

Reality would inform the negotiation process and lead to a concurrence of views and avoidance of confrontation. Reaching the right conclusions requires local institutional capability to draw up correct corporate profiles. It is also important to be able to keep track of global performance and competitiveness of corporations that offer guidance into export markets through distribution channels and networks they claim to control.

Many MNCs make commitments which they cannot deliver. Kenya's textile industry is a victim of such a situation (40). Informed negotiations and corporate profiles would make it possible to preclude potential partners who cannot deliver on agreements. These partners can be a costly obstacle because they obstruct change and transfer an inordinate burden to enabling institutions to lead whole sectors and industries.

Kenya's industrial terrain suffers from dominance of uncompetitive firms and uninformed institutions. Successful development of the national car will depend on changes in this situation. It requires the institutions to acquire the capabilities to define programmes, select partners and negotiate terms. It will also need an exhaustive study of this sector to inform the institutions, improve their decision process and verify reports from organisations in it. NCP activities should have been aimed at addressing many of these issues. What is more, much of what was done could have been left out.

This is the bewildering backdrop against which Kenya's national car is to be launched. It is a terrain that cannot be served by an unrealistic agenda intended to assuage national egos.

Mitsubishi's credentials in nurturing successful motor industries in the Far East are good. However, Kenya is characterised by problems absent in the industrially competent Pacific rim with which Mitsubishi is familiar. One of these is uninformed, erratic and poor preparations in institutional decision making processes. The late arrival of Mitsubishi on the scene may weaken their ability to remove the distortions already entrenched in the national car programme. For the sector to be given adequate support, national institutions need to change their modus operandi and put an emphasis on flexibility. In Malaysia, for example, Mitsubishi's partnership role changed from equity partner and technology supplier to project manager when the civil service trained local management proved incapable of responding to international commercial realities (7:p.150). This was a case of tempering nationalism with commercial realism. But Mitsubishi was required to train and devolve responsibility within a time frame. Kenya's national car may need such drastic measures.

5.2.6 Terrain Management

Navigating an effective entry into the international motor industry will depend on the capability, objectivity and accountability of Kenya's environment enabling institutions. The experiences of the motor trade should be used to highlight mistakes to be avoided. It

is unlikely that, in its current form, the industry can take the lead in indicating future direction. Its experiences is a package of negative lessons, but lessons nonetheless. This would help inform decisions on terrain management.

The Korean performance in international motor industry illustrates the benefits of flexible **policy adjustments by the government on instigation of environment enabling institutions** and the motor industry (72:p.50). It is a case of good terrain management. The industry retains a flexible local component policy that varies depending on whether cars are destined for the domestic market or for export. By the end of 1988, for example, cars for the domestic market contained a localisation ratio approaching **100 per cent** (Table 3). But those for export markets possessed about **70 per cent local content.** Manufacturers still use imported components like carburettors, automatic transmissions and spark plugs for export vehicles because local suppliers do not reach desired standards of quality. This is a case of commercial realism and a pragmatic national car ideal.

Korea's car industry was created by **indigenous firms** and based on a locally designed agenda. Its spectacular success is, therefore, a credit to indigenous initiatives (73:p.16). It is informed initiatives that made it possible for local organisations to select beneficial partnerships and negotiate the best terms. Korea's strategy was based on exploiting new investment and technological

developments and a clarity of purpose sharpened by clear national priorities supported by a transparent environment.

For instance, **Hyundai Motors**, chose to perfect manufacturing, and did not seek all-round motor vehicle capability. It was a step-by-step capability building strategy. It rejected **the traditional packaged recipes** used in most collaborative programmes with MNCs which are based on subservience. Although part of an import substitution policy, exports were envisaged from the beginning. Because of this, international assistance was sought starting with technical help from **Ford UK** and later, Mitsubishi. It was backed by a government determined to develop the industry and competent enabling institutions ready to learn in the process.

Hyundai bought-in technical, managerial, and design expertise **from abroad** and **licensed technology from Mitsubishi**, who now have a **15 per cent equity in the company.** It brought in experts like **John Turnbull** of British Leyland and Talbot UK and **Giorgio Giugiaro** of Ital Turin designers (8:p.19). This team was able to bring on stream the first Korean car, the **Pony**, in two years, in 1976.

The **Pony** subcompact was developed with **foreign design and technology help.** Some components were imported. But it was regarded as a Korean car. This was a realistic, cheap, fast, competitive and commercially viable avenue for attaining the national car ideal. It is the path that takes advantage of

relevant global stocks of knowledge, information and experience. This path has been vindicated by the speed with which the product came on stream and the export success that followed.

Government policy management included an industrial promotion plan which gave incentives for raising and improving local content. Measures included preferential allocation of foreign exchange, investment funds for developing components industry and special low-interest loans. **Technology transfer agreements** signed with foreign manufacturers were intended to improve quality. They were negotiated under scrutiny, and with the support and advice of experts from government institutions.

In **1974** government **changed strategy** and promoted **car production as an export industry.** This was aimed at escaping the foreign exchange trap of traditional assembly and to cope with the post-1973 oil crisis. It involved switching from assembly to **production of 100 per cent local content** and restricting assembly plans of other car companies in order to create the required economies of scale (74:p.16). Foreign funding was sought and negotiated for under government supervision and support. The management of the terrain was flexible, informed and holistic.

The growth of Hyundai vindicates **evolutionary capability building,** commercial realism, effective flexible terrain management and the ability to react to, anticipate and cope with change (73:p.16). It

illustrates intelligent government interventions coupled with transparent and adequate notice to the industry on the duration and measures intended. The notices were adhered to. This consistency contributes to terrain transparency and predictability and encourages the informed participation of organisations. It results in learning in the whole sector and industry and contributes to the process of change. Good terrain management enhances sectoral social intelligence.

The result is that Korean companies have been able to succeed without command of the fundamental areas of the motor industry technical chain. They reap profits from mastery of **manufacture** and **marketing**, but without mastery of design. This niche realisation has enabled Korea to competitively enter top rank production without a grip on all the basics (7:p.49).

It illustrates possibilities and benefits that can accrue from systematic unpackaging of industrial and technological concepts and structures and identifying a niche that is compatible with a country's capabilities. It is an important learning phase that is useful in nurturing total capabilities. However, the industrial history of Kenya shows an absence of this required framework of clearly defined goals, deadlines, flexibility and terrain transparency.

The need to **buy-in capability** is created by an awareness of the

need for price and product competitiveness. It requires a recognition that, for example, design capability can, for sometime and within modest industrial ambitions, be hired and need not be located at the plant or at a controlled dedicated facility. This is the **raison d'etre** for independent operations like **Ital and Bertone** of Turin, Italy, **Motor Industry Research Unit Limited (MIRU), Motor Industry Research Association (MIRA), Ricardo Consulting Engineers, Lotus** and **IAD** of **UK.** These organisations offer independent commercial, research, testing, design and development facilities and expertise for hire. They offer access to the latest developments as well as accumulated industrial experiences, skills and information.

What is important is the ability to make objective self-evaluation and isolate corporate and institutional capability gaps. Only then is it possible to effectively employ bought-in expertise. The failure of NCP to carry out an objective inventory of relevant national capabilities and identify gaps that may require buying-in capability weakened the national car programme. Claims of uncollaborated capabilities made by NCP are a disservice to the programme. It could mislead projections for implementing the next phase.

The development of the Korean motor industry was not left exclusively to market forces (8:p.60). The terrain was managed. It is the lack of innovative terrain management that undermined

Brazil's motor industry (20:p.41). Despite the promise of early 1980s, it became a victim of a national "profligate attitude to external borrowing" (20:p.42) which undermined export flexibility. Poor terrain management led to an erratic, uncertain and opaque environment which derailed investment planning (20:p.64). The result has been wasted capacity and stagnation.

Uninformed government involvement in major investment decisions in the industry contributed to this. In Brazil, this industry is a partnership between the government, the largely **foreign owned vehicle manufacturers**, and a largely Brazilian owned components sector. It is a larger and more entrenched version of Kenya's motor industry scene. The system has cultivated the domestic political skills of firms at the expense of entrepreneurial sensitivity to market trends. This industry has become adept at manipulating government favours and at portraying itself as an instrument of government policy because of government equity. This ear for domestic political nuances rather than business acumen is the sort of culture that KMI is advocating in Kenya. It is the trap into which the NCP team has led the national car programme. But it is the route with the least prospects for growth and success.

Flexibility and adaptability is what characterised Malaysia's national car programme. It had political overtones similar to NCP. The Programme was described as the result of the "foresight and bold decision" of the prime minister (75:p.3). The prime minister

described the occasion of the launch as a "milestone in Malaysia's advent into heavy and high technology industry" (75:p.3). But Mitsubishi partnership was considered important and when problems later set in, Mitsubishi was asked to take the management. This was nationalism coupled with realism.

Malaysia's Programme was not secretive and Mitsubishi participation was recruited early. Mitsubishi was involved in training staff at its plants in Japan from the time the national car company, **Perusahan Otomobil Nasional Sdn. Bhd. (Proton)**, was created in **May 1983.** The **Technical Assistance Agreement** required Mitsubishi to "provide training and progressive transfer of technology" that would enable Malaysia to become self-sufficient in all aspects of vehicle manufacturing (8:p.142). The timely creation of the company ensured a corporate location around which to accumulate loyalty, information, knowledge and skills, unlike the ad hoc committee system for NCP. This became the national focus around which to gather related information, and expertise on a permanent basis.

Proton was an exercise in collaboration. The Proton Saga was to be based on **Mitsubishi's Fiore** model and featured **Mitsubishi Magma single overhead camshaft engines** with a gradual increase in local content levels (75:p.5). The **Joint Venture Agreement** with Mitsubishi provided for "adequate technology transfer to Malaysians (76:p.24).

Construction work on the plant began in **August 1983.** Production began in September 1985 followed by the government's instituting of a "rationalisation process" to prevent dealers importing or assembling competing models.

When management problems surfaced, the **Malaysian Finance Minister** asked Mitsubishi to take over the management of Proton in mid **1988.** Mitsubishi set up a task-force and sent several of its own executives to the Proton plant. They identified the problem as **"management by ex-civil servants"** (7:p.150). **Mitsubishi's senior management** stepped in to help with the running of Proton, an instance of buying-in appropriate expertise.

Mitsubishi instilled a more professional style of management in the Malaysian management team. Proton made its first profit in the **1988/89 financial year.** The improvements in finances were such that repayments for loans were ahead of time. Bringing in foreigners to manage a national capability show-case illustrated flexibility in terrain and project management. Proton ceased to be a national technology capability show-case and became a commercial venture. Patriotism was tempered with realism. Pragmatism serves the cause of patriotism better because the collapse of high profile national projects undermines national pride and reputation.

In 1989, Proton hired Stamford Research Institute of California, world-wide management and engineering consultants, to advise on

competitive sourcing of parts for the car. Based on the Stamford report, 50 high value components sources were selected from Canada, US and South Korea. Proton intended that Japanese content of the car be reduced to less than 20 per cent in two years and be replaced by either Malaysian or alternative sources. Diversifying sourcing reduces dependence, builds technology unpackaging skills, advances reconnaissance capabilities and permits regular stock-taking of corporate or national capabilities. This need to cultivate independent decision making and selection capability has alluded Kenya's motor industry corporate culture. It is an important avenue that NCP failed to explore. It is not the independent ability to re-create technological artifacts that is important. What is required is the capacity to make informed independent and competitive decisions on the choice of technology, partners and the negotiation process.

TABLE 6

Proton's Projected Production Volumes

Production Period	Projected output	Actual Output
July-December 1985	8,290	7,484
Full year 1986	40,250	24,148
Full year 1987	67,600	24,858
Full year 1988	84,400	42,500
Full year 1989		65,700
Full year 1990 (MIRU forecast)		80,000

SOURCE: Motor Industry Research Unit (8:p.142

Pragmatism is vindicated by Proton's export success. Exports were scheduled to start in 1990. But because of the unexpected shrinkage of the domestic market, it was launched in 1986. Successful entry into UK, under a **Generalised System of Preferences**, and managed through the 180 outlets of the British importer, **Proton Cars (UK)**, is underlined by the award of UK's **"Best Value for Money"** car in 1991 (77:p.40). This export success to an OECD country conferred technological acceptance on Proton among other LDCs. African countries, specifically **Kenya, Zambia, Malawi and Tanzania** were reported to have shown keen interest in the Proton following its success in UK.

The cost of the **Proton investment was** put at about **US$263 million** as at **1984** (Table 7):

TABLE 7

Proton Investment 1984-1988	US$ (millions)
Land (donated by Hicom)	**30**
Building and Equipment	**137**
Dies, Jigs, etc	**96**
TOTAL	**263**

SOURCE Motor Industry Research Unit (8:p.154)

Flexibility in Malaysia has been backed by transparent plans and holistic implementation. For example, the current **Industrial Master Plan** (IMP) (8:p.159) focuses on the growth of the local **components industry.** It has been supported by a request to **Proton**

to work closely with local suppliers to help accelerate the development of the sector. It has also been accompanied by a notification to other assemblers to raise local content above current levels of around 30 per cent. The plants have, therefore, embarked on a process of raising local content levels in anticipation of a planned government move about which they have received adequate notice. This illustrates the advantages of a transparent **Master Plan** as a means of serving industry with ample notice.

In Kenya, the unveiling of the national car took the industry by surprise (22). Subsequent announcements have been similarly sporadic, unpredictable, and arbitrary. This includes the announcement of Mitsubishi's partnership in Nyayo six months after the unveiling of the prototypes. Such a style of terrain management increases unpredictability and opacity. In the long run it keeps potentially beneficial capital and partnerships out of the sector.

5.3.0 Conclusions

There are various avenues for capability acquisition. What is important is the need to keep developments in perspective. The fact that large Korean corporations, with resources and established technological capabilities in heavy industry, shipbuilding and electronics, felt the need to seek guidance from established MNCs in motor industry indicates a recognition of intricacies of this

sector. It points out that there is more to this industry than fabricating a self-propelled road vehicle. This was not recognised by Kenya's NCP Team.

Parallel projects addressed special engineering attributes and accumulated information, knowledge and experiences that could have informed NCP's niche-targeting decisions. Learning from such efforts would have saved on duplications in efforts and advised on alternative avenues to attaining the national car ideal.

NCP preparatory groundwork was poor. It did seek for or build information processing capacity required to define issues at this level. NCP was run without an information management back-up and without the ability to monitor relevant developments. This undermined continued awareness and institutional learning.

The insular orientation prevented it from maintaining a learning posture. Without such a posture it lacked flexibility and adaptability. When AVA made representations that suggested possible need for change in direction, the Project found this difficult to accommodate.

NCP also adopted a system low documentation. This is reflected in the manner in which conflicts in suggestions were shelved and forgotten rather than resolved. Without emphasis on documentation, decision processes became arbitrary and accountability was lost.

Poor documentation prevented NCP from being run as a learning and adaptable exercise. It got entrenched in its terms of reference and interpreted them to the convenience of the membership. The Official Secrets Act and the inclusion of the Department of Defence in NCP undermined documentation and accountability in decision making. The Team, for instance, has not justified why it was necessary to produce three prototypes when one pre-production one, as in Nigeria, could have done. It did not justify dropping AVA, a government corporation, from the project.

The absence of balanced representation contributed to the problems. Without finance, marketing and project management experience or expertise, NCP lost commercial realism. This allowed resources to be spent on developing two extra prototypes and emphasising "re-inventing the wheel" without considering costs. This was not a sensible commercial decision. Nor was it sensible to define the "100 per cent Kenya car" without the benefit of industry experience. The seniority of the Advisory Committee and the powers it bestowed on itself also obstructed avenues for injecting realistic ideas into NCP.

The absence of an identifiable accountable organisation also contributed to the problems. It encouraged short-sighted planning because no one held long term responsibility for decisions and actions taken. For instance, no note was taken of the absence of appropriate training facilities in the country and the need to

start accumulating this expertise early. There was no focus around which to collect the experts and the information they would need to carry out their duties. There was no employer to plan and project training and manpower needs. These oversights were the product of their not being an organ responsible for continuity.

NCP was unable to recognise and respond to changes. In this the Project confirmed that there are entrenched problems in Kenya's institutional decision making processes. This prevents the country reaping potential macro-economic benefits that could accrue from having successful institutions and corporations in the country. These institutions can create beneficial spin-offs, increase domestic competition, and further improvements. In Korea, for example, the success of the motor industry has attracted many organisations that now find it beneficial to locate there. These firms want to exploit the cumulative national technical and commercial expertise and to use the country's established reputation for quality to enter export markets.

These potential benefits are undermined by ill-defined national projects like NCP. High profile national failures can ingrain a culture of incompetence and weaken transfer of best practices by not attracting dynamic organisations. This is costly to a country's long-term reputation and performance. It is illustrated by Kenya's textile industry (39) and by this study of Kenya's motor industry.

NCP underlines that with the onset of mass production, the role of artisan and craft skills, emphasised in both Kenya and Nigeria projects, is less important for the success of technological enterprises. As the MIRU (Motor Industry Report Unit) report (8:p.126) emphasises, **"engineering a car for mass production is quite a different matter from building a few by hand".** Mass production requires collaboration and this demands negotiation skills and being informed about the latest developments. The NCP teams, in demonstrating existing artisan and craft skills in Kenya, failed to address the requirements for setting up a mass production industry. In not addressing themselves to the wider issues of the Project, they wasted time and money. By portraying NCP as a university research undertaking, this exercise could undermine public confidence in their capacity to manage research.

It is recognition of the dwindling role of artisan and craft skills and the primacy of information based mass production requirements in all technology products that made the inventive Koreans start their industrial programmes with foreign designs. This is also the route that Japan had followed earlier. It is the route that NCP would have followed if the Team had developed information management capacity and kept abreast with reality. It is the route that has driven this industry towards collaborative research, product development, production and marketing.

This is the avenue involving **buying-in expertise, hiring well qualified staff**, or commissioning reputable research centres. It

is the route for competitively building technological capability. It is the avenue that exploits the opportunities presented by new communication and information technologies which are increasing global transparency. It is an avenue that requires transparency in project design, management and implementation.

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6.0.0 CONCLUSIONS

This thesis has demonstrated that technology transfer and industrialisation in Kenya will depend on the improved capabilities of institutions to enhance internal and external terrain transparency. This information management activity is central to advancing the capability of environment enabling institutions involved with managing technology transfer, industrialisation and development. Investing in advanced information processing hardware, as proposed in Kenya's **Development Plan 1988-1993**, without institutional re-orientation is unlikely to give adequate returns. The contribution of the information sector to Kenya's technology transfer and development efforts will centre on enhancing transparency.

This thesis has shown that institutional re-orientation is necessary if a developing country like Kenya is to benefit from the **"information revolution"** and spin-offs of the information economy. Real gains from adopting new information technologies depend on **appropriate organisational environment** (1:p.77). This fact argues against conceptually equating technology, in the hardware sense, with information and its use. It is information and its use that defines organisational and institutional environment.

If Kenya's environment enabling institutions do not incline towards informed decision making, the intended **"national information and**

informatics policy" (2:p.95-6), will have no beneficial impact on the economy. Information availability is inadequate without the right organisational attitude. In both the power alcohol and national car programmes, available information and expertise was neglected. This was an organisational attitude problem. In such circumstances, up-to-date technology makes little difference. This attitude exists in other LDCs (3:p.179). Adopting new computer technology only raises potential information processing capacity. It does not ensure its use in informing decisions in an economy. Kenya cannot reap the benefits of new information technologies until corporate information use culture is changed.

The report on the World Bank financed restructuring of **ICDC** (Industrial and Commercial Development Corporation) and **IDB** (Industrial Development Bank), the financiers of GMK and AVA respectively, has demonstrated no change. It has confirmed the continuing failure to use existing information and expertise in negotiations preparations and in decision making (4:p.15). In this case, 80 per cent of a loan intended to make the firms market oriented, competitive, self-financing and accountable is to be used in expatriate salaries and computing. The decision was reached without the advise of the boards of directors of the institutions or known local expertise. It was concluded with civil servants who ignored all existing government regulations on conduct of such negotiations. The ICDC/IDB loan was negotiated without a prepared Kenya agenda upon which to base negotiations. All local specific

expertise, accumulated by the two institutions over twenty years, that may have informed the negotiation process was ignored.

The investment practices of these institutions do not conform to original policy. But this was not considered. For instance, their investments in AVA, GMK and Firestone, have not aided transfer of control to Kenyans. But this is what the bodies were set up to pursue. Instead, they have used local resources to fund foreign controlled companies and their bid for monopoly protection. Their investments have camouflaged the true identity of these firms without encouraging technology transfer. ICDC/IDB have used local resources to fund firms that have undermined growth of indigenous technological capability (ITC).

Kenya's institutions have yet to proceduralise inventory of local expertise as a preparatory step in technology project planning. The power alcohol programme was designed without input from resident sugar technologists and chemical engineers. This is what was required to inform discussions and decisions. Decades of relevant sugar technology experience was ignored. The oil companies were not invited to inform plans although they were expected to blend and distribute the product. The national car programme was designed without the local motor trade despite it being the only source of resident expertise in the country.

The culture of ignoring local expertise leads to poor negotiation

preparations. It prevents existing industry from contributing to the creation of new projects. But their informed contribution is important if sectoral segmentation is to be avoided. Poor integration in the motor industry is testimony to the problem. Designing a national car programme without addressing avenues for integration would not serve the long term needs of the programme. It is also this that led to resistance of users to power alcohol. This resistance was costly to ACFC.

The practice of ignoring local experts in technology projects is not a result of considered institutional perceptions on local capability. The NCP did not exclude local motor trade after evaluating its potential input. The approval of KCFC and rejection of the Okeyo proposal was not a considered and informed decision. These are the symptoms of institutionalised arbitrary decision making practices. This practice prevents the necessary process of national capability inventory that is essential for identifying gaps that need remedies like buying-in capability or training. This is the route to building ITC. The fact that technical training in Kenya bears no relation to requirements of its existing industries is testimony to faults in current practice.

Kenya is not short of environment enabling institutions that can manage technology transfer. They are simply weak and do not pursue clearly defined objectives. Poor definition of objectives characterised the two cases studied. Because objectives were not

specified and recorded, the programmes lost direction. Without documentation based on exhaustive informed preparations subsequent discussions used different sets of criteria. As a result, five years into the power alcohol programme, it was being argued that its price was higher than petrol. But this was always the case. Without the benefit of the threads of previous decision processes, the programme now failed on grounds of income generation.

Lack of documentation back-up in deliberations allowed individuals, institutions and organisations to apply discretionary interpretations to issues. Poor goal specificity remains the source of "serious failure in industrial policy" (5:p.181) in Kenya and the cause of continuing dependence on foreign enterprises to initiate and manage industrial expansion. This dependence is illustrated by projects in the sugar and motor industries, funded and guaranteed by government, under open foreign management contracts without a clear training element. This is responsible for the peripheralisation of indigenous technological and entrepreneurial capacities. Kenya's technology agenda is designed for the convenience of foreign corporations. This is why organs like KMI cannot conceive agendas that, for example, would support local componentry.

Ignoring local expertise and importing packaged solutions has led to decades of training engineers, technicians and craftsmen on the basis of a critical-mass ratio formulated and designed for the

United Kingdom (6:p.304). But with the local industrial terrain defined by foreign firms seeking cheap protected locations for fabricating and selling imported parts, no link has grown between training and deployment. The firms do not need all round trained staff and have no special abilities to transfer. This is illustrated by the assembly plants that, despite illusions of sophistication, are simple fabricating operations that only require "operative production line skills" (6:p.304) for "repetitive manual tasks" (6:p.308).

The result is national planning that is out of tune with reality. Plan documents forecast large demands for engineers while industry seeks "on the job acquired skills", complains of "inappropriateness of attitudes and skills of Kenyan graduate engineers" (6:p.309) and considers local training facilities "of dubious quality and relevance" (6:p.311). The sugar, power alcohol and motor industries showed little regard for government planning documents in informing decision making. This is an arrangement that cannot support ITC.

The opacity of this terrain obstructs exposure of manpower to best practices. It attracts and nurtures individuals and organisations that cannot pursue competitive practices. This has led to the practice of avoiding objective performance evaluation by adopting unique terminologies and standards to prevent comparisons with other industries and countries.

This is behind Kenya's motor industry using its own measure for local content. It is why NCP reported formulating new parts numbering standards and creating new tools and processes. It is why AVA reports refer to its having the widest selection of models in the world. It is also why Nitin Madhvani referred to KCFC as a project comparable to none other in the world and diversified its product range without explanation and against the terms of the contract.

National institutional processes of selection show a preference for these organisations and individuals. When the government funds and guarantees the borrowing of these poorly defined projects it permits them to use patriotic appeals to stop criticism. It also gives them the protection of secrecy under the **Official Secrets Act**. This permits uninformed decision making and the unaccountable disregard for existing information and expertise. The decision making errors that surrounded the uninformed approval and management of KCFC project also featured in six years of the NCP project. This shows no learning.

This institutional trait is encouraged by a system of administration that requires little documentation. This prevents lessons from being transferred. NCP was designed and undertaken without the benefit of Kenya's experiences in project management. This was despite it being conceived soon after the collapse of KCFC. Poor documentation also encourages poor project definition

and implementation because decision sources become difficult to trace. This makes decision makers unaccountable. Thus no one is accountable for the faulty definition of NCP parameters and no reason is given for making more than one prototype. Madhvani felt at liberty to breach the contract and convert a project intended to address energy needs into one that emphasised citric acid production. Poor documentation makes it difficult to isolate the source of this action. It allows KMI and NCP to claim non existing capabilities without being required to deliver. Not being required to deliver on commitments and contracts encourages incompetence and undermines professionalism at individual and professional levels. This does not encourage ITC development.

This practice is also evident in government documentation that often make realistically unattainable projections. These are not reviewed in subsequent documentation. It makes the exercise appear fictional and has contributed to a loss of confidence in documented government planning (12,13). The documents cannot inform industrial decisions. They are perceived as government routines intended for the consumption of foreign donors and loan agencies, rather than as statements of policy and goals to be met and used to evaluate national performance. For example, despite the high political profile involved, the case programmes were not preceded by reference in government documents. Neither the country or sectors to be affected were given notice. This has undermined their design and style of management. Wider interest was blocked.

Participative terrain management was precluded.
The result is that existing industry did not welcome the projects.

Arbitrariness protects government institutions from exposure over poor decisions. But it also makes the system unpredictable and only conducive to organisations and individuals that are uncompetitive. Participation only comes from giving ample notice. The successful car projects from the Pacific rim were all nurtured by transparent national planning based on giving industry adequate notice and getting its full participation.

The practice of arbitrariness in terrain management has been transferred to industry. It is the system that assembly sector uses to reject and undermine local componentry and role back local content levels. Assembly draws up conclusions without the participation of local component manufacturers. Remedy through cooperation is not sought. National institutions thus contribute to the transfer of bad industrial practices. This undermines ITC and industrial development.

Without a system of transparent notice, the government cannot recruit the best partners or negotiate the best terms. Both ACFC and KCFC were approved without overtures to local industry (12,13). They cannot, therefore, be the best projects that could have been designed locally. Nor are Mehta and Madhvani the best choice of

partner entrepreneurs. The Advisory Committee of NCP was not chosen on the basis of any transparent system. Permitting it to define objectives and select partners did not encourage use of the most capable individuals and organisations in the country. Opaque selection systems prevent the country from using national projects to take an inventory of existing ITC. But the practice also features in the selection of foreign partners. The partners in the sugar and power alcohol programmes and motor assembly could not deliver the technology transfer ambitions to which Kenya aspired. They illustrate serious weaknesses in partner selection and have proved costly to the country.

This arrangement cannot support transfer of competitive practices into the economy. It intensifies technological dependency and undermines price and quality competitiveness. The products of assembly and components sectors are uncompetitive on both terms. They cannot enter export markets without subsidy. It would be a problem if the national car were designed and produced along similar lines.

The opacity and unaccountability of the terrain in Kenya permits masquerade. The operational weaknesses of environment enabling institutions fails to make the organisations deliver the expertise and terms of their contracts. It encourages organisations to make commitments they do not intend to, and cannot, deliver. Both Mehta and Madhvani took on projects they had no experience in. They used

taxpayers money to fund their learning. It was a costly exercise for the country. They were not even required to deliver on project costs. Madhvani was at liberty to claim export potential for citric acid without specifying the markets or explaining whether KCFC could deliver competitively. Local assembly boasts export potential without being required to substantiate. This culture of unaccountability infected NCP which reported potential in areas it had not studied such as local steel and kits production potential.

Without accountability, existing institutions have no incentive to perform or build capabilities. Many have evolved negative traits. For example, the science officers at the **National Council for Science and Technology** (NCST) do not disseminate information as required. They conceal it. Officers in the ministries of commerce and industry do not circulate sectoral study reports to industries concerned. They file them (12,13). Researchers have become reluctant to register proposals with NCST, which is a legal requirement, or approach it for advice on funds, which is one of its responsibilities, for fear of their ideas being sold elsewhere (9). Associations like KNCCI and KAM are reluctant to approach government departments with proposals because they do not perceive them as impartial, reliable or competent. Many suspect, for instance, that the Okeyo Proposal contents were sold to Madhvani. The potential of organisations like KBS is compromised by their credibility.

This style of terrain management cannot support new projects. It does not nurture excellence, professionalism, accountability and performance evaluation. But this is crucial to the development of ITC. The absence of a transparent peer review mechanism in the country undermines pursuit of excellence because performance cannot be openly evaluated. This encourages claims that cannot be substantiated. NCP illustrates the consequences of this. Nitin Madhvani took advantage of it to politicise KCFC. AVA has used it to curve for itself a role in the motor trade that, by obstructing the evolution of components manufacturing, is actually detrimental to the industry.

Institutions like the **Investment Promotion Centre** (IPC), set up to attract, support and encourage foreign and local enterprises, have drawn up briefs that make them unaccountable. The IPC brief discriminates against local enterprises despite it being a public funded organ. However, it is local enterprises that are most in need of guidance services. By targeting its information services to potential investments of over KShs.5 million, IPC has set itself to serve only foreign investors. This sector is closed to local evaluation. It permits IPC to make claims that cannot be verified locally. IPC is thus not accountable for performance to those who fund it. The result is that it is not designed to take on board lessons from Kenya's recent investment experiences with joint venture projects like KCFC. It operates without an information bank of corporate profiles (10) and without a formal

institutionalised system of accumulating and activating national experiences for decision making. IPC has no system in place that would, for example, highlight a new joint-venture proposal from **Advait International** as requiring extra scrutiny.

Without an institutionalised system of memory to inform government department decision making, IPC has little impact on current practice. It cannot prevent recurrence of joint-venture fiascos in which the government carries the costs. IPC is a case of a new institution that has failed to address the institutional memory gap that is the weakness in Kenya's decision making chain. It did not use its portfolio to inform NCP on investment issues. It may have caused changes in NCP design.

Kenya does not mobilise its institutions when addressing a new project. The result is that institutions set up to address specific issues wither away. This was the case with the inter-ministerial National Projects Committee (NPC) and the **Industrial Survey and Promotion Centre** (ISPC), said to "have died natural deaths" (10). These were central to the decision making processes over the power alcohol programme. ISPC's attempts at institutionalising learning in project implementation, demonstrated by an impressive case library, has been abandoned. The records have not informed subsequent projects, including the national car. Staff at IPC are unaware its existence (10). This absence of linkage prevents continuity in learning. Without learning ITC

cannot develop.

The practice of using formal institutional memory mechanisms remain alien to formal decision making procedures in Kenya. For example, **Kenya Association of Manufacturers** admits losing negotiating capability following the departure of its Director of 15 years when he moved to IPC in 1986. But KAM records, information, documentation and file and operating systems remain haphazard (12). It still relies on the memories, experiences and initiatives of individual staff and board members. This does not support institutional learning. This practice is repeated in other institutions surveyed in this study. Existing information and expertise is not sought as a procedural preparatory step in project formulation. This contributes to poor project and objective definition. Poor documentation exacerbates matters.

Cooperation is created by a need to share strengths and subsidise weaknesses. The potential benefits of cooperation cannot be reaped in Kenya because claimed capabilities cannot be verified. The result is intra- and inter- sectoral, departmental and industry fights. It characterises components, assembly and distribution in the motor trade. It was evident among government departments and ministries over the KCFC controversy. It exists in the relationships between KAM, dominated by MNC representatives, and its views of KNCCI as a grouping of "small traders" with little capability to share (12). It exists in KAM/KNCCI perceptions of

local research efforts at **Kenya Industrial Research Development Institute** and the national universities as unimpressive, irrelevant and unapplicable (12,13). It underpins the decades of infighting for office at KNCCI that has destroyed the internal cohesiveness required for a purposive and sophisticated outlook in tune with current technological and internationally competitive entrepreneurship. This segmentation works against improved ITC.

6.1.0 Policy Implications

This was a study of national information policy and its implications. It sees such a policy as having implications for infrastructures and technologies as well as for training, but it focuses on organisations and institutions as information-utilising enablers of development. It argues that this can be attained by making the environment transparent to development agents and as such advance the cause of both technology transfer and development.

In a more transparent terrain, it is possible to keep sight of objectives and the criteria for evaluating success or failure despite environmental changes. It is possible to effect continuing learning through awareness of relevant developments and making appropriate changes. Without adequate transparency, policy aims like science and technology, training, technology transfer and industrialisation can become elusive and evaluation and accountability impossible to institute.

Shifting and discretionary objectives, such as those surrounding NCP and KCFC, coupled with an opaque terrain gives a high profile to politics in what should be a reasoned, realistic, informed and learning process. An informed community learns to respect and accept rationally deduced decisions even if they are unpalatable. A politicised terrain tends to doctor deductions. This was evident in attempts to pass NCP both as a scientific research and as a product development enterprise. NCP teams found it politically difficult to admit that the country lacked the ability to independently pursue any of the avenues. So it fudged the agenda. However, an information search would have shown that the nature of this industry does not permit independent pursuits.

Without cultivating a culture of informed rationality, trained scientists, for example, cannot be beneficially deployed in informing national decisions. This has implications for national training policy. It underpins the basis for husbanding science and technology in the cause of technology transfer and development.

Kenya continues to plan massive expansions in training and educational facilities (16) despite falling public expenditure. The Ministry of Education sees the avenue for effective use of diminishing resources in greater emphasis in science in schools and universities. But this would be a poorly defined objective if a holistic national terrain was not considered. As it is the country could deploy existing scientists and engineers better. The pursuit of numbers (16) cannot remedy the absence of link between terrain

requirements and training output. This action can only increase terrain opacity.

Not all science graduates get deployed in science-related work. Nor would this, on its own, lead to self-sustaining scientific and technological capability. The aim should be to ensure that scientifically founded skills are applied to decision making and the administration of resources. Both case programmes have demonstrated the national tendency to ignore existing expertise. This will not change by increasing their numbers. The curriculum change that the ministry is advocating cannot influence this arrangement. Informed decision making measures have organisational implications. They demand back-up institutional memory building and procedures that inform and make national decision making mechanisms accountable. Only then can the policy of training more scientists and technologists have an impact on the economy.

An administrative system founded on exhaustive preparations and informed decision making could lead to the re-defining of the goals of the case programmes. The Car Project would not be presented as a scientific research. The power alcohol programme would be re-defined within the framework of the sugar industry and national energy needs. It would lead to the introduction of mechanisms that would censor organisations like Advait International and some NCP participants. This is the basis for building transparent performance accountability.

It would be necessary to evolve mechanisms that objectively highlight the need to de-emphasise powerful institutions that continue to support declining but costly niches, such as assembly, coffee and tea sectors despite international realities (17:p.41-3). Strong institutions supporting declining vested interests obstruct necessary change because of political and societal legitimacy that they attain. This allows them to misinform decision making. Politically inspired manoeuvres become difficult to impose on such institutions because they are adept at political manipulation. Implementing alternative, less popular, but necessary, strategies requires argued and verifiable solutions. This needs consistent and transparent rules because it builds predictability and injects stability in to the process of change.

Without institutional and organisational changes the attainment of critical mass will remain elusive and justification for increased training in science and technology doubtful until such training can be applied and held accountable to national needs. This should constitute the basis of national and science and technology policy.

In an opaque and unchallenging terrain, attainment of educational qualifications becomes an end in itself. It is the means to enter a static, though privileged, station, rather than the means to identifying and solving problems for society. Unapplied skills quickly atrophy because application nurtures learning, innovation,

dynamism and transparent competitiveness. This is what advances the culture of attainment. Without challenge, the rules and standards of attainment become unpredictable and subject to political tinkering. It allows unverifiable claims of the kind that surrounded the case programmes. This is not a culture that can nurture competitive practices. But ITC and technology transfer depends on competitive practices.

6.1.1 The Reality of Kenya's Technology Terrain

The technological terrain is marred by contradictions. It has qualified and informed individuals associated with institutions that display strange incompetence in decision making. Knowledge and technological capability do not converge with resources. This gap undermines advancement of national capability.

The opinion in institutions like KAM and KNCCI, and in organs like KIRDI, NCST and MORST, is that in Kenya, those with the means to venture into technology-based enterprises lack the technical and entrepreneurial capability and inclination for it, while those with capability lack the resources. The country has failed to devise the bridging mechanisms. Transparency contributes to the bridging. It would make it possible for communication and cooperation across this gap.

Information on terrain realities encourages the practice of informed preparation. But informed preparation requires being

apprised of latest developments. This calls for the service of expertise immediately available. This is one way in which experts and specialist institutions can enter Kenya's technology transfer equation. It is the avenue that requires being informed and updated. It is based on continuous learning and would, therefore, support the development of ITC.

Commerce in Kenya revolves around import/export and replication of consumer goods. Institutions that should lead the change towards technology focused ventures have not cultivated the capability and orientation to do so. NCP illustrates that they also lack the inclination. This is why technically capable people are employed in organisations that under-utilise or mis-deploy their skills. Until a bridge can be engineered, this will continue.

This is the vicious circle that directs pent up entrepreneurial energies and skills towards political intrigue instead of designing of competitive products and services as illustrated by components manufacturers, Madhvani Group and AVA management. When entrenched, these skills become obstacles to change and the creation of a transparent and competitive terrain. Signals and information on markets become distorted. Obstruction and distortion of information flow has become the means to serve vested interests. This is illustrated by the way the sugar industry misinformed negotiations with KCFC, by the way KMI distorts signals on the motor trade, and the way NCP reports did not address market issues

that would have censored the project. National institutions set up to transact information and signals between markets, consumers and industry have failed to convey correct signals.

In import/export commerce, which depends on government licences, information barriers have become a means of raising revenue through economic rents. The opacity generated by government bureaucracies has created enterprising middle-men who "raise" terrain transparency at a fee. This is not a simple case of corruption. It is the result of a stagnant and closed terrain in which the absence of challenge leads to misdirection of energies and skills away from the generation, and towards the skimming, of surplus. This is the spirit that is captured in the motto of "sharing the national cake". It underpins the decision of the clerk in a government department who conceals applications and files or a science secretary who refuses to circulate UN reports. These are the results of an unchallenging, unrewarding and opaque terrain that has failed to call its institutions to account and does not inspire the participation of its manpower.

It is not the environment that inspires institutions to nurture the conceptual skills required to unpackage technologies. But it is the responsibility of these institutions to develop and transfer the skills to industry. The Pacific rim illustrates the benefits to industry that can accrue from institutions that inspire its manpower. The Africar Project demonstrated technological

possibilities opened by conceptual skills that unpackage technology and that can back negotiating for technology purchases. The absence of this conceptual ability undermines possibilities for commoditising technology trade. But it is only under such a framework that the various unpackaged parts of a technology can be identified and negotiations for the best terms for the parts considered. A bargaining capability needs to be founded on such competence. But this competence can only be built in an inspired work force. This is the basis for arguing that effective technology transfer in Kenya will depend on the country's ability to mobilise and inspire its information workforce.

6.2.0 Avenues for Further Research Considerations

Information management studies in Kenya have focused on its political perception as either a social service provision, illustrated by the location of national library provision in the Ministry of Culture and Social Services, a propaganda mechanism, by locating information and broadcasting in one ministry, or as an academic service, with libraries administratively catered for in university and college management design. This bureaucratic perception of information as culture, propaganda and education is a legacy of Kenya's colonial past. It is not the result of a considered decision by government departments. It could not, therefore, be linked logically to the rest of the economy.

Therefore, information as an input into the management of strategic

socio-economic change and as a competitive resource with actual and potential advantages has not been recognised or provided for institutionally. This is partly because the managers of national policy have failed to perceive the country as in competition with others. Only competitiveness would force the need for informed and accountable decisions in bureaucracy. What is more, the general collapse of the economies in the region and continent, has given the illusion of considered judgement to the country's decision at independence to tether the economy to MNCs.

This illusion was punctured by the collapse of commodity prices. It exposed weaknesses in what has passed for an industrial sector. It showed that Kenya's industry consists of assemblies and sub-assemblies that survive on the earnings of its commodity sales. What is more, the sectors were fragmented and did not integrate with the economy. Even food processing, for example, is not an integrated entity (20). Kenya's industrialisation destiny had been trusted to partners who lacked the competitive skills to transfer. The country is not acquiring competitive capabilities. But this is essential to ITC and technology transfer.

The absence of sectoral integration is confirmed by a lack of sectoral information flows and a general disregard for awareness that has entrenched the practice of false assumptions and uninformed decisions. More defined sectoral studies could help identify the obstructions to information flows. This would enable

measures to be taken to improve sectoral integration. It is the lack of linkage that, for instance, blocks the growth of the components sector without which the country cannot develop a competitive national car programme. It has also led to an artificial barrier between the sugar industry and power alcohol programme. Lack of links has contributed to the absence of convergence between the output of training institutions and requirements of industry. Links require unimpeded information flows.

There is a need for a study of cultural traits that may underpin the information management styles identified in this study. Menou (21:p.121) considers culture as "all transmitted social knowledge" and a man-made part of the human environment. Differences are evident in the way, for example, information is handled in Kenya, Nigeria and the Pacific case projects looked at. Information management and information is culture-specific, it becomes incommunicable unless it has been **"accultured"**. The disregard for information in the case programmes may be the result of it not being in an "accultured" package. Cultural information packaging for organisational decision making is an avenue for further study.

It has been suggested that Africans, culturally, handle information differently (22) and that this finds its way into the work place. The view is that when this peculiar system of information handling is unimaginatively grafted on to an imported Weberian bureaucracy,

problems follow. This requires further study if appropriate social engineering measures are to be identified, devised and implemented.

Some see the problem as the result of a system in which the "person, office and information easily become congealed in to one" (22). This would, of course, make introduction of objective evaluation and review procedures difficult. Menou (21:p.126) talks of power perversion that makes "the privileged few so incestuous that they breed mediocrity and are incapable of expeditious singular activities and respond sluggishly and with imprecision". He ascribes this as contributing to the "collective imbecility" (21:p.126) that dogs institutions despite the presence of very able individuals. This would require a more focused study to diagnose.

More precise, empirical and multi-disciplinary studies of information and development in Africa are required. This study confirmed that in Kenya, individuals are aware of the value of information for personal gains. This explains the efforts to conceal it in order to exact fees for disclosure and the existence of a market that sustains these activities. The reasons underlying the failure to transfer this perception to institutions and to competitively deploy information needs to be diagnosed. Only then can it be possible to navigate flexible development without the social cost of disposing able individuals who, despite their valued abilities, have stacked their vested interests in stagnation. The

accumulated skills can be retained if individuals and institutions can identify with change. More focused studies on information management and institutional change could inform on possible avenues for inculcating this culture in the workforce.

Studies of the information economy highlight its positive impact in developed economies. They also point to the illusion of this growth in LDCs through bloated bureaucracies (23). There is a need to integrate strategic national information management with development through studies that contrast the "immiserizing" and counter-development paths of well resourced Latin American countries (24) with that of the resourceless Pacific rim newly industrialised countries. Such studies would isolate more clearly the benefits of information management to terrain management and development. They would put the emphasis on people and creativity rather than resources. The studies need to underline time, space, sequentiality and knowledge, as dimensions of information (25).

In broad development terms the framework for undertaking such studies is ready. Renowned management thinkers are shifting focus from diagnosing corporate success to looking at macro-terrains that breed such success. Michael Porter exemplifies this evolution through his work on competitive strategies of corporations and the conclusion that location in certain macro-terrains generates more corporate success than others (26).

The Pacific rim's "rare degree of central economic planning between government and industry that smacks of a corporate state" (27:p.3) and Peter Drucker's "new realities" (28) are similar signals. The focus is on macro-economic information management in nurturing international competitive corporations. It includes works that emphasise macro-institutional importance of nurturing and sustaining competition. Rosabeth Kanter's (29) study of how the competitive spirit can be destructive and obstructive when allowed to degenerate into short-term personal pursuits is relevant and illustrated by this thesis. The cost of obstructive national institutions and the off-shoot of rent-seeking enterprises is also De Soto's theme (24). The groundwork for empirical studies that would integrate national information management into the development equation is thus in place.

However, integrating information into the development agenda requires that its management take a form that is amenable to normal bureaucratic tools of measurement and management devices like accounting, auditing and evaluation. These need to be drawn up and applied to corporate information resources management. A wider definition of information needs to interweave information activities with non-information production chains. This would define corporate information handling capability as the capital that supports the management of change. This requires more empirical studies that fuse information with optimum resource allocations, learning, and development (30:p.10).

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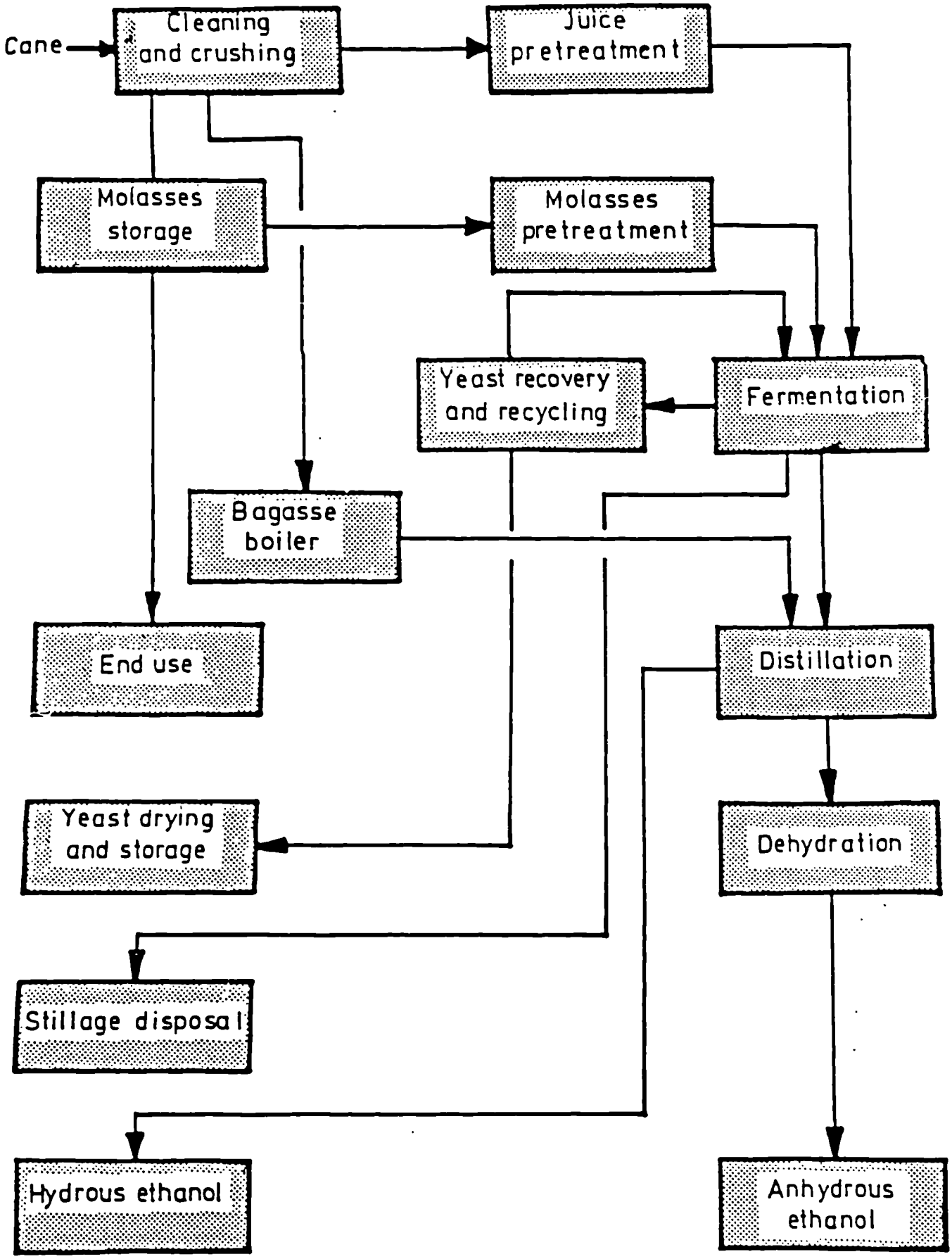
APPENDIX 1


Cane
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Bagasse boiler
End use
Distillation
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Dehydration
Stillage disposal
Hydrous ethanol
Anhydrous ethanol