

6.2 Research synthesis

CHAPTER 6

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The preceding chapter dealt with the findings of the research as conducted. The research was done against the backdrop of the hypothesis as postulated earlier in the thesis (*Supra*. Chapter 1, par. 1.3.1).

This chapter not only interprets the findings but also validates the literature and theory against the findings based on the research parameters (*Supra*. Chapter 1, par. 1.3.1). This interpretation implies that this chapter in effect brings together the three aspects of problem definition, theory and research (*Supra*. Chapters 1,2,3,4 and 5).

The importance of this chapter is found in the aspect to validate and contrast the findings in order to draw conclusions and make recommendations. This will effectively address the problem as stated. In as much as it should it be deemed a requirement, a solution in the form of a model to overcome the issues found, will be presented.

This chapter is structured around the applicability of the aspects as defined by theory, the applicability of the findings from the questions, deductions based on the aforementioned, the necessity of employing the missing theoretical points or drivers and forces, and a conclusion.

6.2 Research synthesis

The synthesis of the research, in the field of information management and technology (*Supra*. Chapters 2,3,4 and 5), is based on the concepts of data, data manipulation and statistical inferences. In the United States of America, politicians apply information management and technology to keep abreast of the political needs of the citizenry. Examples cited are that of the Mondale campaign and, more recently, the Bush/Gore Presidential election. In these cases the politicians applied the vast amounts of data contained in specially designed and developed databases to determine outcomes or to apply customised approaches during the election campaign.

What is evident from the literature is that pure transactional management was and is not enough. Data have to be inferred or statistically manipulated in order to be able to plan strategically. In the American presidential elections this was a necessity not only in order maintain a lead but also to understand the needs of the citizenry at various levels and in various geographic areas. From this the element (or driver) management thus enjoyed prominence. No differentiation is made at this time between transactional and executive management information. From the research done (*Supra*. Chapter 4 and 5), it also becomes apparent that when institutions implements and apply information management and technology it is to improve efficiency and effectiveness of organisations of such institutions, thus supporting this element as a driver. The literature research also refers to cost reduction as a requirement thus, supporting this driver. Other aspects covered in the theoretical research are:

- a. Improved productivity, which relates to the performance measurement driver.

- b. Improved access to information, which relates to the driver availability.
- c. A more transparent governance which may be related to the force, training and skills development.
- d. Improved contact with the citizenry, which may be related to the force, culture.
- e. Improved workflow that will lead to departmental optimisation which may be related to the force, departmental adaptation.
- f. Improved system design and standardisation, due to the improved work flow analysis, of the relevant tier/organisation, which may be related to the force control.
- g. Improved contact with the citizenry, which may be related to the force, human resources, primarily due to the fact that in the political scenario this will be the voting populace. In the public sector the citizenry will be the workforce.

What now needs to be established from the literature research is whether it also supports the denominators identified in terms of the maturity levels (*Supra.* Chapters 2,3,4 and 5). Required for the implementation of information management and technology, references to instances where maturity and maturity levels are considered as an essential element, reflects on the numerous statements referring to the empowerment of the citizenry (*Supra.* Chapters 2,3,4 and 5). Also supporting this are the references to making information available to the citizenry and having more transparent governance (*Supra.* Chapter 4, par. 4.3). Reflecting on the information technology *per se* Chapter 4 and 5, reflects on the need to have a sufficiently supportive base of technology available in order to comply with the demands of the information era. Emphasis is also placed on the fact that technology without a communication infrastructure implies a useless technology

base. Referring to the communication denominator and not communications *per se* the horizontal and vertical communication of intent and objectives are not that clear in the literature research. In this regard reference to participation is made which may be translated into communication have been undertaken. Chapter 4 has several references to the need for research prior to the implementation of information management and technology with specific reference to the type of solutions to be applied and the type of systems to be deployed. Finally, throughout the literature in Supra. Chapter 4 there is an underlying message that the economic viability and cost must be seen as determinants of solutions in the technology environment, hereby warning against over-capitalisation or impossibility to sustain or support expensive infrastructures over time. It may therefore, be concluded that the literature research supports the concept of having the identified drivers, forces and denominators. It may also be concluded that the applicability thereof holds true for the literature research.

An item that needs further elucidation is the management information aspect. Chapter 2 (Supra., par 2.3-2.4 and Chapter 4, par 5.3.2.2) has reference to a concept called service management, which refers to the manipulation of data in order to obtain something else than transactional management information. In the rest of the literature research statements implying the need for more than transactional management information are made. In the references to the United States of America's presidential elections it is also implied that (statistical and other) inferences on existing and designed databases, were made by the presidential candidates support teams in order to lead the race for presidency. With regard to the rest of the theory, reference is only made to transactional type management information and the improvement thereof. It may therefore, be concluded that although implied, executive management information is identified as a

need, barring some exceptions, it remains relatively absent from the practical scenario.

6.3 Research applicability

The objective of this thesis is to determine what the information management solutions for policy making and implementation in the public sector should be based on in terms of available and applicable information technology.

The most important aspects ascertained was that the successful implementation and acceptance of information management and technology can only be obtained when the following two aspects are addressed:

- a. The driving forces.
- b. The transversal elements (denominators) that influence the postulated problem statement.

6.3.1 Drivers of the departmental management information and technology

The five drivers that will be considered are management, availability of information and technology, cost reduction/avoidance, effectiveness and efficiency, and performance measures and measurement.

6.3.1.1 Management

Management was considered the most important driver and the research determined the degree to which management was affected by the implementation of information management and technology systems. From the research the need for management information is clearly stated (*Supra*. Chapter 2, par. 2.3 and 2.4). However, no distinction is made between the aspect of transactional and executive

information needs. What is stated is the need to execute the transactional level tasks more effectively (and efficiently) and for management to have tools by which to manage this.

The research results all indicate an aspect whereby the management results were focussed on general management information. Herein lies the fundamental difference of transactional management and executive management information and the application thereof in the departmental environment in order to maximise efficiency and effectiveness. The findings virtually all reflected the point of view that transactional information needs to be stored and managed in order to improve effectiveness and efficiency. In terms of the South African public sector reflections on a tool to manipulate or execute statistical inferences is yet to be identified.

6.3.1.2 Availability of information and technology

Availability of information and technology was considered a driver due to the importance that information has for management (*Supra*. Chapter 5, par. 5.3.1.2). Furthermore the non-availability of data implies the incapacity to effectively and efficiently manage a department. The availability of data, however, proves to be the least of the problems. Making the data available tends to be more of an issue. The availability of data in most instances is due to lack of communication infrastructure or even, to some degree, lack of information technology infrastructure. Having this lack of infrastructure, in turn, results in the lack of having a consolidated database (or data-warehouse) of information at the disposal of the department in question for the application of management. The absence of a central or consolidated database of information inhibits the departmental capability to apply statistical inferences or data manipulation for executive information management and decision-making. The absence of the central database does not, however, inhibit the transactional management requirement or need.

The reason for this is that even if remote and non-linked information technology is available, those offices can still continue with their transactional capabilities. The presence of a central database fundamentally proves the concept that the public service in essence does have information available to manipulate. The problems associated with this, however, reside in the ambit of infrastructures and inference tools.

6.3.1.3 Cost reduction and avoidance in the implementation of information management and technology

Cost reduction or avoidance was considered a driver because the decision to implement information technology has a great budgetary impact on any public service department. Within the South African context this is especially true, as certain departments have experienced severe cutbacks on their capital expenses. The point, however, is that after implementation the department must be in a situation to render a more effective and efficient service at a reduced cost or at least at a cost that is equal to the pre-implementation cost. In the normative research this aspect was conclusively proven (*Supra*. Chapter 2, par. 2.3 and 2.4).

In the case of the empirical research, however, the aspect of high investment cost with a high return on investment must be a consideration. The theoretical and empirical research also shows that long-term savings from having a information technology system, would indirectly reduce the budget of the department involved. The empirical research does, however, indicate that due to new cost and expenditure elements such as maintenance and data-lines, consideration must be given to a cost trade-off with regard to the net gain in budgetary terms. The indirect savings obtained from the increased productivity and improved effectiveness of the department would even have a greater impact on the overall functioning of such a department. The indirect

savings obtained, according to the aim of the empirically researched departments, would prevent astronomical budget hikes. Cost reduction/avoidance is therefore an important aspect that needs to be given due consideration when the decision to implement information technology is made.

6.3.1.5 Performance measures and measurement parameters

6.3.1.4 Departmental effectiveness and efficiency

The driver performance measures and measurement stems from the
Improving departmental effectiveness and efficiency should be a major aspect when the decision to implement an information management and technology solution is made. Making this decision with regard to information management and technology implies that the need for management information at all levels should be known. In turn this implies that both the need for transactional improvement and executive management needs should be defined and addressed (*Supra*. Chapter 2, par. 2.3 and 2.4).

The research indicated that this was an important consideration. The research determined that most organisations accepted the effect of this driver to the environment prior to, during and after implementation of information management and technology solutions.

The empirical research also in most instances conclusively pointed to this aspect being a driver. The public service as a whole has for decades been notoriously bad at service delivery. In order to improve on this effectiveness and efficiency has to be improved. Due to the cumbersomeness of the beaurocracy and the regulating policies and procedures the amount of paperwork has increased through the years. The beaurocracy resulted in decreased effectiveness and efficiency. The research points out that effectiveness and efficiency must be increased after implementation of an information management and technology solution. When effectiveness and efficiency, is not attained, or attainable, the solution or the target group is incorrect. In the research it was found that the implementation of the information

management and technology was aimed at improving service delivery and therefore improving effectiveness and efficiency. The research, however, did determine that the executive information needs were not addressed.

6.3.1.5 Performance measures and measurement parameters

The driver performance measures and measurement stems from the aspect of improvement, which must, however, be measurable against some norm or standard. The standard must be known to the department in order to determine the success of the implemented solution. Furthermore, the public service as a whole and a department in particular cannot invest major sums of capital without knowing what the return is going to be and what it is the return should be on (*Supra*. Chapter 2, par. 2.3 and 2.4). The reason for this is that the decision to implement information management and technology should be aimed at improving service delivery.

From the research the importance of performance measures and measurements was clearly stated. Performance measures and measurements was, from the aspect that an organisation, must be understood to have its own requirements prior to the decision to implement information management and technology is taken. Improving departmental performance reflects on the benefit attainable through implementing a technology solution.

From the research, the departments did not initially know what they were improving. Departmental performance occurred only after they became knowledgeable with regard to information management and technology implementation. The departments did, however, plan on what milestones had to be achieved during implementation and got more skilled in this project management capability as more systems were implemented. However, on the point of knowing what had to be improved, the empirically researched departments did not in all

instances know what had to be improved. Identifying the parameters occurred only after the initial implementation of solutions and these parameters improved as more solutions were implemented. The lack of identified measurement parameters implies that not only should consideration be given to what solutions should be considered but also to the aspect of the achievement that must be a direct result of the implemented solutions, in other words what area of the business must be improved in terms of effectiveness and efficiency.

6.3.2 Departmental forces

The departmental forces are those elements the department has control over. In the context of this thesis they are human resources, culture, training and skill development, control and departmental design.

6.3.2.1 Human resources

Human resources as a force is that component that if not addressed correctly will lead to the rejection of any implemented solution. The rejection will be primarily due to the effect the changing environment has on the work force.

From the research it became evident that any proposed solution in terms of information management and technology must be thoroughly communicated throughout the department (*Supra*. Chapter 2, par. 2.3 and 2.4). Furthermore the research points out that where this was not done, major resistance to change was experienced. In the situations where attention was given to change management, major successes were registered in terms of implemented solutions. The successes then gives validity to the application of this element as a force and due consideration should be given to it before and during implementation of a information management and technology solution.

6.3.2.2 Departmental culture

Culture from an implementation perspective, is as important as taking cognisance of change management. Culture is a departmental inborn trend that needs to be addressed through communication and training.

From the research no distinction was made between the departmental culture and the human resource culture. However, the aspect of due consideration to culture as a force to be considered was addressed. Also evident from the research was that the element of culture was not always given due consideration. In such cases this also led to rejection of the implemented solutions. As departments grew and organisations developed, change management was affected more easily when identified as a need in the changing environment of the deployment of information management and technology solutions. Where public service departments took cognisance of this element prior to implementation the culture shock was much smaller and the migration to a technological environment was smoother.

6.3.2.3 Training and skills development of personnel

The element of training and skills development at all levels of the organisation is imperative to transform a public organisation to a functional and manageable entity. Due to the changing environment and needs of the public domain, the need to change and adapt to the fast track of the information age implies that all levels of management and functional application are required to be adept at the use and application of information management and technology. From the normative research it was ascertained that training and skills development was indeed a factor to be considered.

In the international examples the application of training and skills development was indeterminable. In terms of the empirical research the application of training and skills transfer, although not initially in some

instances, was considered an important element. In these instances where this element was addressed prior to implementation it even assisted the culture change and change management of the projects. In all the empirical examples training, either initially or later, played an important role. Also of note, are the continuous training programs identified that are meant to keep the staff (at transactional and management levels) up to date with regard to new developments in the field of the information management and technology deployed.

6.3.2.4 Control

Control is a crucial consideration when the decision to implement information management and technology is made. The lack of due consideration for the element of control resides in the perception that the implementation of electronic solutions does not necessarily improve managerial control but rather diminishes managerial control over the transactional functioning. In effect the implementation of information management and technology should actually improve control (*Supra*. Chapter 2, par. 2.3 and 2.4). Once this improvement concept is accepted, the implementation process is accepted and the culture changes to acceptance and the change management process is assisted. From the normative study it was clear that improved control must be a consideration for the successful implementation of an information management and technology solution.

From the empirical perspective the international examples were not clear regarding the element of control. However, it was clear that control and the improvement thereof were not only a consideration but were actually applied in the national examples cited. Specific emphasis was put on the improvement of (transactional) management control. It may therefore be stated that control, and the improvement thereof, in so far as the national perspective goes, is considered to be an

important success element for the implementation of information management and technology.

6.3.2.5 Departmental change

Departmental change is essential in the event of the implementation of major information management and technology solutions. Again this element closely interfaces with the afore-mentioned elements, in that it impacts on change management, culture, and training and skills transfer.

From the research, departmental change or adaptation was not specifically advocated, however, it was implied. In the literature the effect or impact of the implementation of technology solutions either directly resulted in or forced a change in the organisation after implementation. Also from the research, the international examples did not reflect on any departmental change. Again, it was implied in some of the examples in terms of improvement of service delivery. However, from the national examples it was evident that departmental change and adaptation was a criterion for consideration. It may therefore be stated that in terms of the South African public service scenario, departmental change was indeed a factor of consideration at the time the decision to implement information management and technological solutions was made.

6.3.3 Denominators

The denominators or transversal elements are: Research prior to implementation, economic viability of the implementation decision, maturity levels of the organisation, available information technology and communication.

6.3.3.1 Solution design research

Research as a denominator is critical in the user requirement design for the implementation of information management and technology solutions. As these solutions are usually costly, a wrong decision can amount to major fund or budgetary losses. The need for specific solutions must also be critically balanced against availability, applicability, sustainability and life cycle costs (*Supra*. Chapter 2, par. 2.3 and 2.4).

From the research it was evident that research into solutions must be detailed for a specific scenario or problem definition. The proposed solution(s) must not only comply with the required outcomes of the organisation but also be measurable, sustainable and attainable. It was also partially evident from the international examples that research was a factor for consideration. In terms of the national examples of the public service, research was considered a major transversal element when the decision to implement information management and technological solutions was made. The element of research also remains high on the list during the entire life cycle of the implemented solution in order to remain at the forefront of technology. It may therefore be stated that as a denominator or transversal element, research into possible solutions is an important function that needs to be performed prior to and during the life cycle of the implemented solution.

6.3.3.2 Economic viability

The denominator economic viability interfaces closely with research. Both impact on the eventual cost and expenditures to be incurred. Information management and technology must under all circumstances only be considered if it is economically implementable and sustainable. Due consideration might be given to outsourcing technological solution as it is firstly, not part of the core function and secondly, not financially

feasible to maintain such services within the organisation. It also implies that systems should not be implemented if they cannot be maintained as this will lead to fruitless expenditure (*Supra*. Chapter 2, par. 2.3 and 2.4).

From the research, the economic viability of information technology solutions was addressed in the sense that poorer countries and even counties/provinces might not be in a financial position to implement required solutions. On this issue outsourcing functions within the departments might then be given due consideration. The international examples were, however, not all clear on this issue. From the national examples cited the application of the transversal element of economic viability was given due consideration and was factored into all decisions of development and implementation over the total life cycle of the proposed and implemented solutions. It may therefore be stated that as a denominator economic viability has a role and function when the decision to implement information management and technology is made.

6.3.3.3 Maturity levels

Maturity levels as a denominator interface with the driving forces in as much as they affect management, effectiveness and efficiency as well as departmental adaptability, culture and training. The maturity level of an organisation is indicative of the culture and departmental positioning in the information technology environment to accept change for improvement. The best systems can fail if buy-in from all levels is not attained. Furthermore, proposed and implemented systems must be perceived as an aid and not a danger to the organisation. It is imperative that all levels of the department must share this perception. Training and communication may influence maturity levels.

No specific reference is made in the literature study to the need for or the effect of maturity levels on the decision to implement information

technology as a solutions provider. Only inferences are made to the perceived benefit of such a solution to a department. From a practical point of view, the international examples has no references to this denominator and the assumption must be made that they either considered it as a sub-set of one of the driving forces or alternatively gave it no due consideration.

From the national examples cited, two aspects, to wit the maturity within the department in question and within the service provider, were considered important. The research concluded that, without a mature environment (an environment which accepts change for the benefit of improved effectiveness and efficiency) and mature service provider's implementation of a technology solution is not attainable. Maturity, according to the research, is attainable through training, communication and change management. It may therefore be stated that the denominator (or transversal) element of maturity needs to be considered when the decision to implement information technology in the public sector, is made.

6.3.3.4 Information technology

The denominator information technology in this perspective implies the infrastructure availability to support an information management environment. Implied herein are the aspects of interconnectivity (local and wide area networks) and the existing status of the computer hardware. This is an imperative as old and out-dated hardware such as 286/486 computers will not be able to accommodate newer released software. Nor will they be able to accommodate networking, which is required for database facilitation.

From the literature study, it is clear that a solid foundation of advanced information technology and infrastructure is required in support of proposed or implemented information management. From the research in general and with regard to the international examples, it is clear that

advanced technology is required to enhance service delivery (*Supra.* Chapter 2, par. 2.3 and 2.4).

From the national examples cited, it is also clear that advanced information technology is the only solution in order to enhance service delivery. Furthermore the requirement for connectivity requires such forefront technology. According to the research it is also easier to remain at the forefront once such infrastructure is put in place. Maintenance and other cost factors are then greatly reduced. It may therefore be stated that in terms of a transversal element, information technology status should be given due consideration when the decision to implement information management and technology is made.

6.3.3.5 Communication

The denominator communication is an important element when the decision to implement information management and technology is made (*Supra.* Chapter 5, par. 5.3.4.5). The literature research does reflect on this element from the perspective of marketing intent and communication capability (technical). References are made not only with regard to management participation and buy-in, thus implying communication (marketing intent) but also to the need to bring the message to the greater citizenry and obtain greater participation from them. The study further highlights the need to be able to reach every citizen by means of some communication mechanism, thus focussing on the technical aspect of communication. Global connectivity is also addressed.

The research on the international examples, however, has little if any reference to communication from the perspective of marketing intent. Some reference was given with regard to citizen participation, which implies communication. This does not reflect on communicating intent prior to implementation (*Supra.* Chapter 2, par. 2.3 and 2.4).

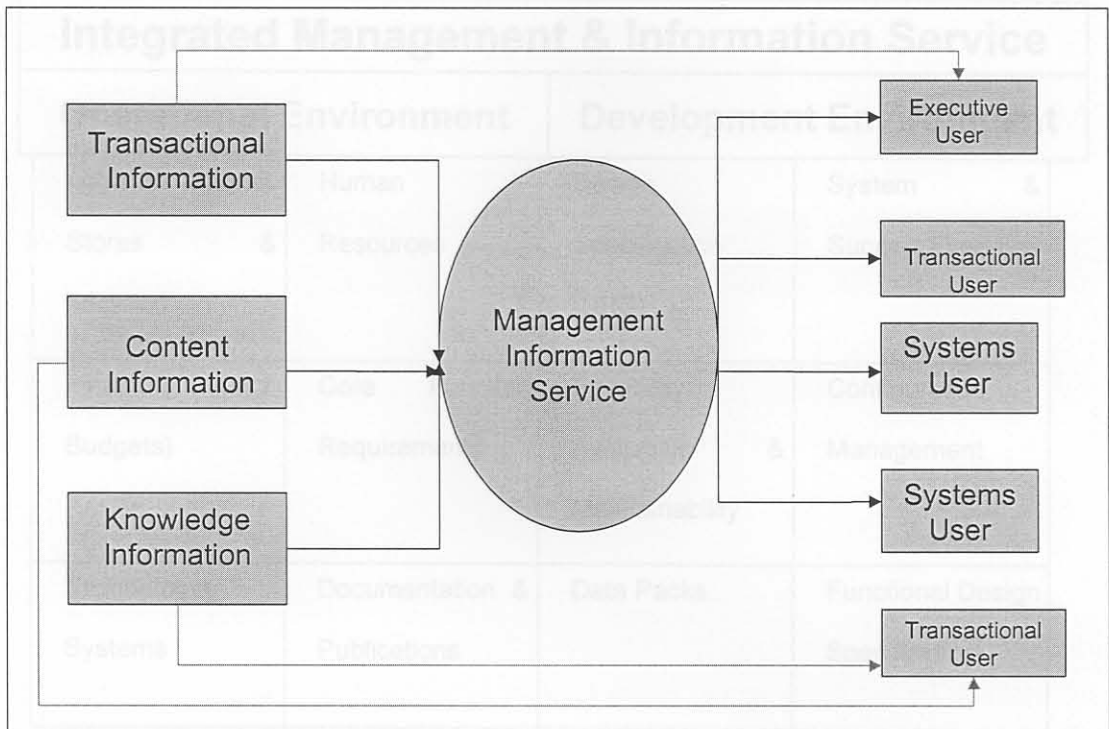
From the national examples cited, the study found that, in the older transversal systems, little communication occurred. However, with the later systems and information management and technology solutions, communicating intent and obtaining participation was of the utmost importance. It may therefore be stated that communication, as a denominator, has a fundamental role to play in the design, implementation and maintenance of proposed and implemented information management and technology solutions.

6.4 Proposed information management and technology model

To address the problem of implementing executive information management, it will be required to implement a strategy to specifically address the issue of information requirements. In order to facilitate an easier transformation when the decision to implement information management and technology is taken, the composition of the management information requirement must consist of:

- a. Functional or transactional information, which by definition consists of all transactional activities such as data captured with regards to functional or day-to-day tasks.
- b. Content information, which is relevant to the organisation such as files and records (for example case file for the Department of Justice, voting figures for the Independent Electoral Commission and mission available systems for the Department of Defence).
- c. Knowledge management information, which per definition consists of that information, which refers to circulars or to information, contained within proposals and policies, developed within a department, or the individuals own ambit of expertise.

These components must be integrated into a database or data-warehouse (institutions consolidating databases for data retrieval purposes) from which statistical inferences or other forms of data manipulation may be made in order to obtain executive management information. Normal transactional or data management information may at the same time be obtained from the relevant serving input components. Important in this methodology is that any user at his/her applicable level may obtain information concerning the management level pertaining to that user from that data-warehouse. This implies that the data-warehouse must be dynamic enough to allow search and queries in order to satisfy the decision-making process applicable for that level. This also implies that it must be preferably a system, designed from the onset to accommodate such inferences or queries. Data is obtained from transactions, content and knowledge management. This data is then captured in a central repository, which will have the capability to do statistical inferences as per user requirement, in order to obtain executive management information. The information from the repository will be available to transactional users, systems users and management. The application of this information might be in its original format for transactional use, pre-defined requirements (system management) or executive management information (statistical inferred information for strategic decision-making). In instances of content and knowledge management, transactional users will access their data required for day-to-day activities direct from the source. In a seamless environment, using middle-ware (additional software to manipulate the data from designed systems), access to the reworked management information will be possible (Blignaut, 1992:20-42). This concept is depicted in figure 6.1.

Figure 6.1: Information Management Integration

Source: Adapted from Blignaut, 1992:42.

In order to have the management information available a system must be designed to facilitate the availability and accuracy of such required information. It is also an imperative that such information needs be integrated into a single service delivery. To facilitate this integration to public service management requirements, it is proposed that the following approach be followed (Blignaut 1992:20-24):

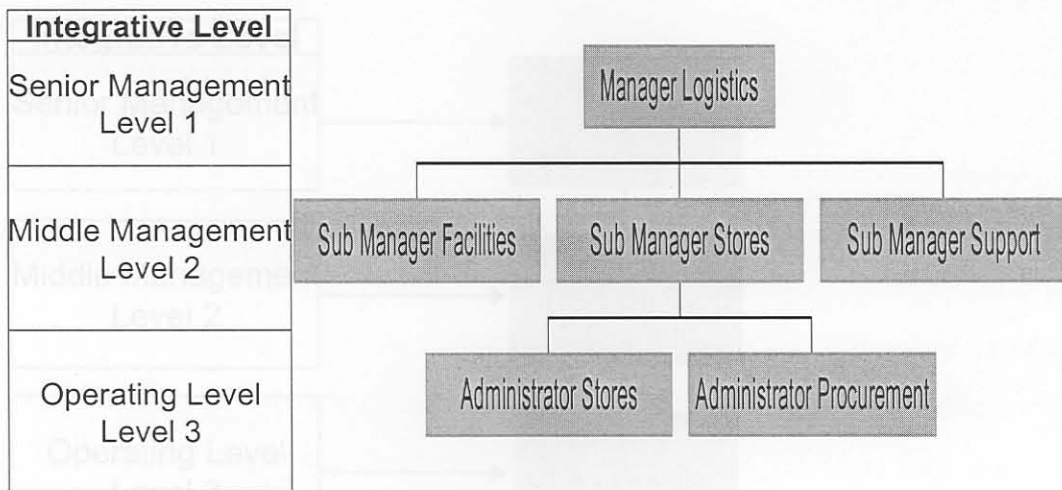
As a management information solution. A further aspect is that in order for the model to be successfully implemented, the model must be implementable and applicable to all levels of a department. When implemented at all levels and utilised integratively, decisions based on accurate information are possible. This will also facilitate policy making (Blignaut 1992:24-57).

Figure 6.2: Integrated Management Approach

Integrated Management & Information Service			
Operational Environment		Development Environment	
Logistics (incl. Stores & Facilities)	Human Resources	Design Specification (URS)	System & Support Expertise
Finances (incl. Budgets)	Core Function Requirements	Reliability, Availability & Maintainability	Configuration Management
Technology Systems	Documentation & Publications	Data Packs	Functional Design Specification

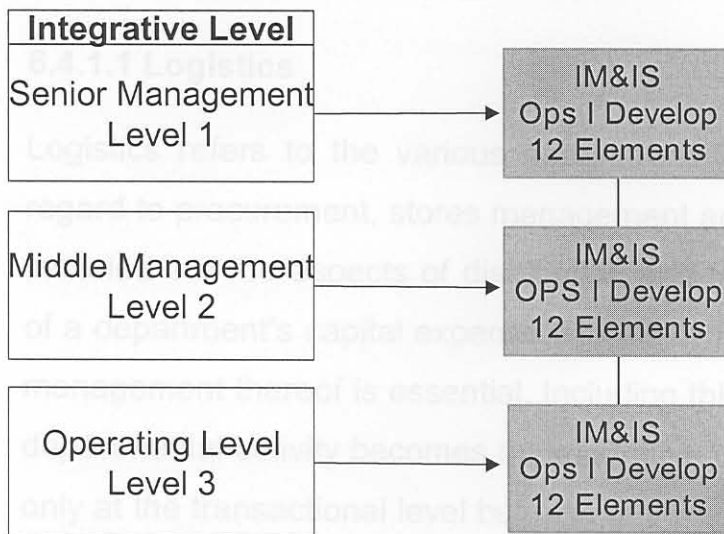
Source: Adapted from Blignaut, 1992:24.

In order to have applied information management and technology in the public sector it is proposed that the process be defined as having two primary components. These components are the operational and development environments. Each component consists of six elements, which refer specifically to their environments. These twelve elements must be integratively addressed in order to produce a information management solution. A further aspect is that in order for the model to be successfully implemented, the model must be implementable and applicable to all levels of a department. When implemented at all levels and utilised integratively, decisions based on accurate information are possible. This will also facilitate policy making (Blignaut 1992:24-67).

Figure 6.3: Management Levels

Source: Adapted from Blignaut, 1992:37.

This also implies that the same model must be applicable to the various management levels within the department. Thus the same twelve elements will be equally applicable to the transactional levels where functional or task execution occurs and to the executive management level where strategic decision-making and eventually policy formulation, has to occur. The decision-making, in turn implies that whenever a requirement is initiated, at whatever level, the integrative process is the same and all components and elements are applicable. In turn this will result in not only having participation from all levels of the department but that the actual implementation after policy formulation will be easier as the public servants whom where participants in the process, have the knowledge to communicate policy to the broader populace. It also holds true that as they are closer to the populace and the can identify more readily with needs of the populace, inputs in executable policies will be of greater value (Blignaut 1992:45-71).

Figure 6.4: Management Structure Match

Source: Adapted from Blignaut, 1992:42.

The various components and elements of the model (*Supra*. Figure 6.2), could be explained as follows.

6.4.1 Operational Environment

The operational environment is that which pertains to the normal work activities of a department, which would want to implement information management and technology. Executive information management and technology is based on attention being given to the various drivers, forces and denominators required for the successful implementation thereof (Blignaut 1992:24-35).

Once the required implementation of the drivers, forces and denominators has occurred, attention may be focussed on the most important element of this component to wit the core business of the department. This may be any level of the existing three-sphere approach or, more pertinently, focussed on a department such as the Independent Electoral Commission, Department of Defence,

Department of Justice or any other government department (Blignaut 1992:35-41).

6.4.1.1 Logistics

Logistics refers to the various departments or spheres function with regard to procurement, stores management and technical support. Also included are the aspects of distribution and facility management. Most of a department's capital expense is allocated to these aspects and the management thereof is essential. Including this function in terms of any departmental activity becomes an imperative to manage this aspect not only at the transactional level but also at the executive level. In terms of the transactional level, aspect such as State Treasury and the Auditor General are major role players, and at the executive level it becomes necessary to manage the strategic direction of a department in terms of decision-making and policy formulation and implementation. These policies and decisions must be based on reliable information management and technology (Blignaut 1992:24-72).

6.4.1.2 Human Resources

No department can succeed in attaining its mission or vision if there is no commitment from the human resources employed by such a department. Human resources being included as an element under the component 'operational environment' are the functionaries, who either execute the transactional management or the transactional level (task level). It also includes the staff that is charged with the responsibility to lead the department strategically. The human resources element was also very prominent as a driving force as decisions are taken at all levels of the department by staff. In turn they must be equipped to not only capture information but also to interpret information needs. This activity of interpretation may also lead to improved policy formulation and management (Blignaut 1992:24-71).

6.4.1.3 Finances

Finances, in terms of the economic applicability, featured prominently in the driving forces and denominators. This element as a function in the model is imperative, as any department (at any tier level) is dependent on its budget vote (allocated funds as per Parliament decision or White Paper). In terms of finances this activity involves the managed expenditure against the approved budget as well as the attaining of the departmental goals and objectives within the allocated funds. All strategically approved or envisaged aims and objectives as well as the transactional functioning must be contained within the approved budget. Managing the approved budget also calls for policies to govern this activity. In this relationship, departments may have consolidated and integrated information available for the Department of State Expenditure to improve executive decision-making and policy formulation (Blignaut 1992:24-72).

6.4.1.4 Core Functioning

In order to understand the executive information management and technology requirements of the department, one aspect continuously stressed throughout the research of this thesis in the application of the driving forces and denominators, is in terms of the core function of the business. This is also applicable to the transactional management needs, which must not be neglected. Executive management information for departments with regards to the core function is crucial. Policy formulation and implementation affects the department as whole and must thus be based on accurate information obtained from established databases (Blignaut 1992:24-72).

The core function reflects on the particular functionality that a department was initiated to perform. Such examples are the Department of Defence (responsible for the defence of the Republic of South Africa), Department of Justice (responsible for the courts and

related Justice activities), the Independent Electoral Commission (responsibility of running of free and fair elections), the Department of Public Service and Administration (responsible for public service) or the Department of Water Affairs and Forestry (responsible for supplying water and forestry services).

6.4.1.5 Technology Systems

This element reflects on the ability of a department in terms of its capability vested in the technology available to perform the service of management and information services. This reflects directly on the infrastructure as required and as mentioned in the driving forces and denominators with specific reference to the available technology and the sustainability thereof to manage the transactional and executive needs of the organisation or department (Blignaut 1992:35-72).

6.4.1.6 Documentation and Publication

Without documentation and publication or prescripts no organisation can function. This element was indirectly reflected on in the denominators but still forms an essential part in terms of departmental or departmental needs. Should this not be present, no control over the required systems or design is possible. Also to be noted is that if no cognisance be given to this aspect, the management of any implemented system will be difficult, as the basis from which such a systems was developed would not be understood (Blignaut 1992:35-72).

This function or element reflects on the control mechanism and facilitates the maintenance of the product, policies, service or system implemented. Moreover, the maintenance of this element reflects directly on the departmental capability of formulating and implementing policies. Having accurate documentation and publication capabilities, ensures having control over the department. It need also be stated that

this element need not be a manual system of large volumes of books and documents, but may be contained within an electronic documentation database (Blignaut 1992:35-72).

6.4.2 Development Environment

The development environment refers to the design and development of the required solution in terms of the information management and technology solution required by the department or organisation. The development process may or may not, as complete or as individual entities, be executed within the organisation or department. Herein implied is that the use of outsourced/sourced-in capabilities are acceptable. Within the development environment the aspects of the engineering principles are noted with regard to the establishment of the required solution. Within this component are contained the aspects of design, development and documentation of the required solution in accordance with the user specification. Design is important as the data capture for management at all levels is to be explicitly catered for during this component's activity so as to ensure data integrity (Blignaut 1992:72-124).

6.4.2.1 Design Specification

Implied in the design specification are the requirements to satisfy the needs in terms of the management needs of a department. These include the transactional requirements that may be derived from the transversal systems or the executive needs required for steering the organisation or department on a futuristic course. Design specification also implies the reworked user requirement specification on which the organisational and departmental needs are based. These in turn are deduced from the management requirements above and beyond transactional requirements. This implies a specific participation and the first level of integration between the user group and the development

group. The outcome will be a detailed requirement with regard to that what is expected as an outcome from the process of implementing the action of information management and technology (Blignaut 1992:72-124).

6.4.2.2 System Support Expertise

System support expertise is the expertise required for the design of the system. This implies the expertise available to not only design a system but also to make the required inferences available without the aid of middle-ware or supportive software in order to do statistical inferences on existing data for executive management information. The middle-ware expertise allows the design of systems around available hardware and software irrespective of brand name and also allows new developments not known at the time of requirement statement (Blignaut 1992:72-124). It is a knowledge field, which allows innovation to suit user requirements. In the absence hereof the implication is a purely transactional system.

6.4.2.3 Reliability, Availability and Maintainability (RAM)

The purpose of identifying the third element of the development environment is twofold. Firstly they represent the representation of the soft issues. The soft issues are the reliability of available information or quality of information (accuracy or information vis-à-vis corrupt information), the availability *per se* for example quality and the representation of the sustainability of the information available (data integrity). Secondly, this element represents the impact of hard issues to wit hardware and its reliability in terms of mean time between failure and availability in terms of system uptime and maintainability in terms of cost to repair and mean time to repair. This is directly linked to the identified driving forces and denominators with regard to the successful

implementation of an information management and technology system (Blignaut 1992:72-124).

6.4.2.4 Configuration Management

Configuration management is the method by which control will be achieved during development. The element of configuration management focuses on the maintenance of record keeping during the development phase and addresses version and content control of the developed product or system (Blignaut 1992:72-124). Based on the initial system design and possible subsequent changes, a detail record keeping is essential for future enhancements or maintenance to the system.

6.4.2.5 Functional Design Specification

Functional design specification (FDS) is the essence of the design of the proposed solution. This specification forms the basis from which the coding is initiated and eventually results in the proposed solution. The functional design specification is based on the user requirement specification (or design specification) as stipulated by the user. The functional design specification allows the computer programmer (or developer) to eventually translate the user designs specification into code (or the required design) and in turn results in a program (or product) (Blignaut 1992:72-124).

6.4.2.6 Data Packs

Data packs are the culmination of the development environment and represent the collection and collation of all relevant documentation pertaining to the developed solution (Blignaut 1992:72-124). This data pack must be transferred to the systems manager in the organisation or department that requested the system or solution, as all future changes and maintenance must be referenced and logged against this data

pack. The data pack should contain the source code of the solution, and will also contain all relevant maintenance aspects required to affect changes to, or maintain the solution.

6.4.3 Integration Process

The integration process for either information management or technology requirements is initiated by the requirement from the operational environment. Any or all of the operational elements may have a request or need for an information management and technological solution. Any or all of the operational elements are phased through to the development environment by means of a business case, which broadly addresses the need. From this a design specification is drawn-up with the aid of system support specialists. On acceptance of the design specification by the future user, the functional design specification is completed for the programmers (developers) to develop an acceptable solution. Parallel to this the progress of the developing solution is documented for configuration purposes. As the system is developed, testing will occur to ensure compliance to the required reliability, availability and maintainability. After user acceptance and system implementation, a compilation of all documentation, codes and diagrams will be collated. These documents comprise the data pack (Blignaut 1992:100-124). The data pack will be submitted to the systems (or project) manager in the operational environment from which the implemented systems will now be managed. The user department executes maintenance of the implemented solution. Enhancements will however follow the same route as if a new design is required.

Application or use of the solution is within the ambit of the various elements of the operational environment. Should it be a transversal system, all identified users will benefit. If a particular user requested the

solution, the application will be within the ambit of that user department or organisation (Blignaut 1992:72-124).

The integration of the development elements addresses, holistically, the total need of either an organisation or that of a department in terms of both the transactional and the executive information management need. Both aspects may be approached through the same route.

The management of the integration process should be done through the establishment of an office which, must collect, collate, manipulate and infer data to the requirement of the department. This office should also be responsible for the security of both data and information and within the ambit of the public sector domain, the making available of this information to the broader public. This method will result in greater participation in the governance and government in South Africa.

6.5 Conclusions

This chapter dealt with the analysis of the findings, the design of a model to address the problems experienced in the public sector information and technology scenario and a discussion of the added value of this study to the field of public management and administration.

This thesis had as its aim the validation of certain requirements for the successful implementation of information management and technology in the public sector. With regard to the previous, it may be stated that at least the following driving forces and denominators are to be present when the decision to implement information management and technology is made and therefore address the postulated problem. From the basis of the outcomes required by the decision the following drivers were addressed:

- a. To assure that management, both in terms of transactional and executive needs of the organisation, is clearly defined in terms

- e. of a frame of reference. Also to assure that management participation is obtained from the onset of such a program.
- b. To assure that data is available for the statistical inferences required for executive information and to assure that transactional data is available for the functional day-to-day activities.
- c. To assure that cost reduction/avoidance is addressed as an objective to be attained.
- d. To assure that the improvement of effectiveness and efficiency is addressed as an objective and managed accordingly.
- e. To assure that performance measurements and measures are realistic and that improvement is measured against known baselines.

With regard to the considerations required from the departmental environment, which act as forces on the decision-making scenario, the following essential requirements were addressed:

- a. To ensure that the human resources element is adequately addressed, especially in the arenas of communication and change management.
- b. To ensure that the cultural aspect of the organisation is considered and that cultural change program be initiated to protect against culture shock.
- c. To ensure that sufficient training and skills development is offered to all levels of the organisation before, during and after program implementation.
- d. To ensure that the concept of improved management and transactional control is understood.

- e. To ensure that departmental change is investigated and implemented prior to or at the latest during the implementation of the program implementation. This holds true for the required policy and procedural changes that might be required as well.

With regard to the considerations required from the transversal environment (denominators), the following essential requirements were addressed:

- a. To have and maintain compliant maturity levels within the organisation (both at management and transactional levels) and within the service provider environment.
- b. To have and maintain a modern and supportive information technology base from which to implement an information management and technology solution.
- c. To have and maintain a communication plan in order to inform the organisation with regards to the changing scenario.
- d. To have and maintain a continuous research strategy with regards to the information management and technology prior to during and after implementation.
- e. To have and maintain an economical balance with regard to the implementation decision.

The value of this chapter is found in the analytical dissemination of the available facts as obtained from the empirical and literature research. Further value is obtained by the design of a solution in the form of a model in order to address the problems or lack of information available at the time the decision to implement information management and technology is made in a particular department or organisation within the public sector. The analysis of this chapter and the findings and proposed model from this chapter logically lead to the proposed

implementation of such a solution in the public sector with specific reference to departments wishing to implement information management and technology therein.

INFORMATION MANAGEMENT AND TECHNOLOGY IN THE PUBLIC POLICY MAKING AND IMPLEMENTATION IN SOUTH AFRICA: CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The structure of the value assessment was done in accordance with the thesis layout. An in-depth evaluation of arguments was presented in order to clarify the reasoning and value added by the thesis and approaches followed in the thesis. In conclusion proposed further fields of study was postulated and evaluated.

Initiating this study and thesis was a perceived lack of information management and technology in the public sector for policy formulation and implementation. This perceived lack as mentioned, in turn, contributes to the lack of service delivery improvement by government and the various departments functioning within the public sector. In all instances this perceived lack is not due to the lack of data but rather the application thereof. This in turn focussed the attention on the application of the technology required, to not only house the information but to retrieve information.

From the foregoing chapter (*Supra* Chapter 6), it becomes imperative that the thesis be evaluated in terms of a value assessment of the findings. This value assessment of the thesis was done against the backdrop of the magnitude of data and information available in the Republic of South Africa's public sector and specifically the government