PROJECTS ARE SYSTEMS: PEOPLE, EQUIPMENT, MATERIALS AND RESOURCES MANAGED TO ACHIEVE A GOAL

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When the topic of this article is considered, a fair assumption regarding the concept of projects would be that they are indeed systems in which various resources are managed to achieve specific goals. This assumption, based on the general accepted definition of a system being an organised sum of coordinated and interacting parts, rings true when people, equipment, materials and resources (all interacting parts) are managed (coordinated) to achieve these set goals.

Using the Green Scheme project in Namibia, this article will examine the relationship of the project management system with its environment, various viewpoints of the project management system, the dynamics and characteristics of projects and project management, as well as the project management process. Through this examination the article will validate the importance of these issues and how organisations relate to them, especially regarding the success or failure of a project.

There are specific organisations involved in the Green Scheme project, which will be used to demonstrate the functional implications of certain assumptions made in the article. These assumptions with relevant justifications are critical to the value that this article can add to the development of project managers. The Green Scheme project therefore presents a research opportunity, examining the possibility and long-term sustainability of a project that relies on *progressive elaboration*. The research objective would be to prove assumptions to be relevant or not, supporting the challenge to assist the Namibian Government in successfully establishing a proud legacy for their President.

Based on published research, expert judgements and personal experiences, the article will endeavour to add practical relevance to the study field of project management.

Key phrases: characteristics of projects and project management; project initiation process, identifying possible project constraints; project life cycle; project management process; project management system; systems approach for project management

INTRODUCTION

Namibia is a country on the west coast of Africa, rich in various resources including diamonds and marine fisheries. Namibia's people are from a mixed variety, combining German colonial descendants with local Ovambos, Kavingos and Caprivians in the north with Herero and Damara tribes in the central regions, not forgetting the odd expatriates from Britain, Australia and South-Africa (Southern Domain 2005: Internet). Namibia has been independent since its first democratic elections in 1990, when SWAPO leader Dr. Sam Nujoma was elected as President (Southern Domain 2005: Internet).

Biomist is a South African business which was introduced to the Namibian Government via an agent for Mist Systems CC, Mr. Chris Liebenberg, at the Windhoek Agricultural Show in October 2004 (Directorate of International Trade 2004:Internet). Mist Systems CC is a business operating in various industries where dust suppression, chemical dissemination and temperature and humidity control is required, with Biomist as its regional agent in the Mpumalanga and Limpopo provinces of South Africa.

It was because of these specific applications that an official of the Ministry of Agriculture, Water and Rural Development invited Mist Systems CC to present a proposal forming part of the Green Scheme, a project of the ministry that aims to develop 27 000 hectares of irrigation land along the five perennial rivers of Orange, Okavango, Zambezi, Kwando and Kunene in the next 15 years, according to Tjaronda of the Newera newspaper (Tjaronda 2005:Internet). In this article, Tjaronda refers to the Green Scheme as a project that is expected to start early in 2006. "A project is a system of people, equipment, materials, and facilities organised and managed to achieve a goal. Much of the established theory and practice about what it takes to put together and coordinate project organisations, comes from a perspective called *systems thinking* or the *systems approach*" (Nicholas 2004:51).

A clear understanding and appreciation of the "systems approach" is important for any project manager. It forms the foundation of the project management process. This process consists of five process groups: initiation, planning, executing, controlling and closing (Heldman 2004:22). "Project managers are concerned with the "big picture", and as such, they must be systems thinkers. By definition, a system is "an organised or complex whole; an assemblage of things or parts interacting in a coordinated way" (Nicholas 2004:52). We can therefore refer to *projects as systems.*

The *systems approach* for *project management* can be seen as an art. Project managers must have the ability to keep the whole system in mind while trying to understand and predict the effects of changes in the elements or sub-systems on the project management process active among them. Consider the example where a Green Scheme project manager's decision affects the outcome of a planning or executing process, leading to a possible delayed finish or increased cost or lower

quality, all contributing to a negative outcome regarding the triple constraints of time, money (resources) and quality present in almost every project.

Assuming that the Biomist project manager decides to wait for all the components needed for the humidification plant, in transit from their main supplier in the US, the deadline to have this plant up and running could be in jeopardy. The Biomist project manager must recognise their input as an element of the main project, and manage the activities accordingly.

Systems are constantly changing or fluctuating, making it difficult to anticipate the effects of these changes in sub-systems on the system or project as a whole. This concept can be defined as *progressive elaboration* where "the characteristics of a product or service of the project are determined incrementally and are continually refined and worked out in detail as the project progresses" (Heldman 2004:3). It becomes clear that small changes in a project could have huge impacts and even lead to the development of new systems.

Referring to the previous assumption, a more efficient ordering or logistical support system can be developed to ensure that Biomist attain their set goals (project deliverables). The correct installation of their pumps, pipes and nozzles within the required time is the measurable outcome that must be achieved in order to consider that part of the project or project phase complete.

What often complicates the *project management process* is the effect of sub-systems on the system (project) as a whole. No project is ever without any problems, and efforts to correct these could lead to new problems in another process group. An organisation might take action to prevent executing inefficiencies, but in so doing, create a new problem in example the controlling process group which might be even more difficult to rectify than the original problem.

The development of a more efficient logistical support system for Biomist in the Green Scheme project can presumably lead to a larger problem in their controlling process, necessitating additional passes through the planning process in order to realign the executing process with the project objectives. Project managers are

encouraged to take note of the systems concept and principles and to integrate it with the project management process.

THE PROJECT MANAGEMENT SYSTEM AND ITS RELATIONSHIP WITH THE ENVIRONMENT

Before a project manager can take a certain action, a clear understanding of the system and its relationship to the environment is necessary. The Green Scheme project in Namibia is an excellent example of this statement, especially when the project's objective is to be in "totality the country's blueprint towards achieving maximum food security and agricultural production in the country" (Tjaronda 2005: Internet).

When the concept of a *Project Management System* is considered as being "composed of organisation structure, information processing, and practices and procedures that permit integration of the "vertical" and "horizontal" elements of project organisations" (Nicholas 2004:11), it becomes clear how important this relationship is with the environment because of the system's dependence on internal and external resources.

Both the internal and external environments of the organisation play a role: "Environments have changed from being evolutionary to being revolutionary" (Smit & Cronjé 2002:54). This means that the organisation now requires the ability to respond rapidly to changes in the environment and these changes would require a flexible workforce, a workforce that can be appointed and managed for a specific project.

The requirement for the Green Scheme project is exactly this. Engineers and consulting firms, responsible for managing a workforce of experts in the farming of grapes and dates, coordinated over 27 000 hectares, including 13 commercial and 260 small scale farmers, substantiate the necessity for this required flexibility in order to make project a success over the next 15 years.

THE CLASSICAL AND BEHAVIOURAL VIEWPOINTS OF THE PROJECT MANAGEMENT SYSTEM

When the current viewpoints of management are evaluated in terms of "propositions and methodologies" (Nicholas 2004:20-21), it is clear that they are the results of management's evolution. The classical viewpoint started at the beginning of the 20th century, evolving into the behavioural viewpoint in the 1930s, and further evolved into

the systems approach during W.W.II, ending up with the current viewpoint of contingency.

The classical viewpoint is based on the principle that there is a "best way" to manage. This means that a standard set of administrative and measurable management principles are applied to all situations. Unfortunately these principles presumed "much more order and rationality than actually exists, therefore they provide poor guidelines about how managers should practice these principles in different situations" (Nicholas 2004:20-21). It could almost be viewed as the "by the book" management method where managers follow a specific process of methodical actions regardless of the situation in which they are applied.

In the Green Scheme project, a project manager or commercial farmer "coached" in the classical way, acting as a service provider to the less experienced small scale farmers, could delay certain phases of the project by not applying own initiative or common sense.

Assuming that the standard set of administrative and measurable management principles require this service provider to assist the small scale farmer to produce the first harvest of grapes within the project goal of four years for full production, and the service provider does not recognise the need for training or farm management skills, then the sustainability of that small scale farmer is doubtful, jeopardising the success of the project after its expected completion date of 15 years. This is a "classic" example where the project is managed on the basis of not allowing the situation to determine an action, but rather forcing the "by the book" action on to the situation.

With the behavioural viewpoint the focus have shifted from the traditional work principles, or the fundamental management functions of planning, organising, leading and controlling (Smit *&* Cronje 2002:8), to the "human and social aspects of organisations. Suddenly the importance of leadership styles, group dynamics and social environments are acknowledged, but still management was looked at rather narrowly" (Nicholas 2004:21) and managers had to continue trusting their own best judgement, relying on their experience and "gut feel".

This will be one of the challenges for the Biomist consulting team, operating under licence for Mist System CC, deployed for the Green Scheme project in Namibia. Geographic differences and logistical constraints will force this project team to apply

many of these behavioural viewpoints of systems management, especially when they need to trust their own best judgement, rely on their experience and act on "gut feel".

PROJECT MANAGEMENT DYNAMICS

Managers need to be accustomed with the various management viewpoints, they should understand and evaluate any opposing situation and then decide on the most suitable leadership style to manage the situation. It is important to note that *Project Management* does not necessarily provide a foolproof recipe for success.

Project Management is a dynamic set of processes with particular aspects that need to be considered. The project is "a temporary endeavour undertaken to create a unique product, service or result" (Heldman 2004:2). Considering this definition, one could summarise a project as *the process in which the functions of management are applied to achieve a specific outcome within the parameters of a set budget, using a selected flexible team from multi-disciplinary structures and expertise for a limited time only*.

Most projects have *three predominant goals*: "to accomplish the work for a client or end-user in accordance with *budget, schedule*, and *performance requirements*" (Nicholas 2004:10). These requirements are also defined as *projects constraints* "every project you'll encounter must work within the triple constraint combination of time, money (resources), and quality" (Heldman 2004:6). Biomist's deployment in the Green Scheme is precisely this, setting out to achieve a clear objective, in a pre-determent time within specific budgetary constraints.

The *need for Project Management* stems from the unpredictable, drastic changes in the current business environment, making forecasting more arduous than in the past and sometimes even unrealisable. Managers need to become familiar with "scenario development, that is, the visualisation of alternative futures" (Smit & Cronje. 2002:54). This type of development does not allow any long-term employment and managers would need to work more and more with project teams, or flexible workforces, appointed for a specific project on a non-permanent basis. These temporary organisations are subjected to the parameters of set budgets, limited resources, time schedules as well as the dynamics of an ever-changing environment. Only through applying *Project Management* principles, could organisations manage to cope with these complex variables and environmental uncertainties.

Nicholas identifies these *principal components of Project Management* as the identification of tasks required for completing the project, identification of resource requirements and costs, establishing priorities, planning and updating schedules, maintaining control over the progress deadlines, monitoring and controlling end-item quality and performance, ensuring that customer expectations are met, and measuring the project performance and determining whether or not goals were met in terms of budget and schedule.

When these components are considered for the organisations involved with the Green Scheme project, and specifically Biomist, it can be assumed that the project manager have incorporated these principles in his plan. Not knowing what tasks to perform, or what resources will be required to complete the project, will be detrimental to the overall success of the project. It would almost be like giving a sailor a ship and telling him to sail, he will have no destination, no direction and ultimately no success. This assumption illustrates that projects, and therefore project management, have very specific characteristics.

"Projects are temporary in nature, while operations are ongoing. Projects have definitive start dates and definitive end dates. The project is completed when the goals and objectives of the project are accomplished" (Heldman 2004:3).

Considering this definition the particular characteristics of projects are described by Nicholas as being very *specific* with a clearly defined purpose, being *unique* or a one-of-a-kind activity, *temporary* with definite life cycles and goals to be achieved in a given period of time, based on *multiple skills* and expertise from specific areas within or outside of the organisation, with *unfamiliar outcomes* projects possess elements of uncertainty and risk that represents *something at stake* or jeopardy to the organisation in the event of project failure, and finally projects are characterised by the *processes* of working toward achieving a goal.

With these characteristics in mind the assumption of the Namibian Green Scheme as a project can be justified. Tjaronda's article states that the project will start in early 2006, presumably January, and be completed in 2021, presumably December, with the objective of maximum food security and agricultural production in the country. The project has a budget in the form of a government secured credit line, financed through the African Development Bank, the Arab Bank of Agricultural Development,

and the Organisation of Petroleum Exporting Countries, of N$360 million and it has as goal the sustainable production and maximisation of food security and agricultural production for Namibia.

“Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements” (Heldman 2004:6). Clearly *Project Management* has specific *characteristics* too, and is described by Nicholas as being managed by the *project manager*, a single person that heads each project and taking responsibility for it.

The *project manager is the pivot* for bringing all the cross-functional efforts toward a single project objective and by using *multi-skilled teams* that supply expertise from all different functional areas used as resources. He is therefore responsible to *integrate people* from different functional disciplines, *negotiating* directly with the functional mangers to secure support for the project from these various functional departments. The project manager must be able to diffuse any possible *conflict* arising from the allocation of resources through the functional mangers to the project, utilising both the vertical- and horizontal *chains of command* during the project phase. *Rewards and criticism* for the project is shared among team members as well as the supporting functional units.

This project *organisation is temporary* and at the end of the project, the team disbands, members returning to their own functional unit until they are reassigned to the next project which can *originate* at a different place, either inside or outside of the organisation. *Project Management* sets into motion many other *support functions,* all of which will be deployed as resources to the project and its outcome-based goal achievement.

There are *nine Project Management knowledge areas* as described in Heldman (2004:36), namely project integration management, project scope management, project time management, project cost management, project quality management, project human resources management, project communications management, project risk management, and project procurement management.

Discussing each of these knowledge areas fall outside the scope of this article, but it is important to note how each of these knowledge areas form part of the *Project Management processes*, combining common characteristics of different processes.

Biomist will need to employ the project cost management knowledge area that involves all aspects of budgeting. This budgeting process also forms part of the resource planning, cost estimating, cost budgeting, and cost control, all belonging to different project management process groups that share many common characteristics.

The different project environments where project management may be applied

The environments of projects as classified by Roman in Nicholas (2004:35) are the *Commercial environment* to maximise profit with an end-item that is clearly defined as a product or service of the completed project. Project managers stay involved with the product through its entire life cycle and retain contact with customers and top management. The Biomist project manager would presumably stay in the Green Scheme region until the local system operators are fully trained, not only capable of installing the next humidification plant, but also do preventative maintenance on Biomist installed equipment. The project manager will give continuous feedback reports to the Namibian government (customer) and Mist Systems CC (management).

The *Governmental environment* is where non-profitable projects are initialised. Project managers are easily reassigned to different projects and their role is largely that of an administrative function due to outsourced activities. The Green Scheme project is presumed to be initiated in this environment. The main objective of the project is not to make profit, but to secure maximum agricultural production and self sustainability for the country.

The *Military environment* is where the “systems evaluation” is more important than the economic factor and project managers, which are mostly military officers, are more concerned with technical criteria than costs and profits. For example, the development of artillery systems during South Africa’s isolation years and the Border War in Angola resulted in highly technical ordnance for very specific applications, regardless the cost of development.

Project Management can be applied to most situations, large-scale undertakings, such as building a new motor highway, as well as the smaller or more frequent activities, such as upgrading the office layout. The dynamics of Project Management is distinct in the fact that it has to contend with so many variables, possible outcomes

and contingencies, that the unfamiliarity characteristic of a project could possibly be the single biggest challenge for any project manager overseeing any project, no matter the size or importance. Unfamiliarity could easily lead to uncertainty and even a lack of confidence considering the single dimensional measures for outcomes. It is, in other words, difficult and challenging to manage a project for which there is no comparative standard to measure the outcome with.

The fact that *Project Management* has evolved to cope with all these environmental changes, group and social dynamics, system diversities and situation variables, and all the uncertainty they bring, it has to be said that *Project Management* is dynamic in itself. These dynamics confirm the contingency viewpoint that recognises the fact that no single viewpoint could guide a manager in all aspects of the job for every possible situation.

Project Management needs to (according to this contingency viewpoint) be consistent with the requirements of the environment and assist managers to "understand and diagnose each situation, and then choose the most appropriate mix of procedures, leadership styles, and management functions" (Nicholas 2004:21).

THE PROJECT MANAGEMENT PROCESSES

Not only does *Project Management* apply the basic functions of management, namely planning, organisation, leading and control, but it furthermore implements the principles of task identification, resource identification, establishing priorities, planning and updating schedules, monitoring and controlling product quality, and measuring the project performance. All of these above-mentioned factors are sound considerations to validate the dynamics of *Project Management*, and forms the basis of the *Project Management Processes*. Considering this as the basic theory, an application example will help to illustrate the practical implication and importance of these principles.

Assuming that the Green Scheme project attracts a host of highly skilled and professional organisations, all experts in their relevant fields, it will be detrimental for Biomist to omit even one of the abovementioned principles. Consider the effect on the project if the Biomist project manager is negligent in controlling product quality. This could lead to a failure during one of the phases in the critical path of the project and influence one, two or all of the triple constraints, resulting in project failure. This

example is based on the assumption that there are no other contributing factors to project failure, highlighting the importance of *Project Management* and the possible result of one "slip up".

A Guide to the PMBOK documents five process groups in the project management process: Initiation, Planning, Executing, Controlling and Closing (Heldman 2004:22). This part of the article will look briefly at the initiation process and only define each of the other processes of the *Project Management Process* group.

Initiation "…occurs at the beginning of the project or phase. Initiation acknowledges that a project, or the next project phase, should begin. Initiation grants the approval to commit the organisation's resources to working on the project or phase" (Heldman 2004:22). According to Tjaronda's article, the Namibian government approved the Green Scheme Policy in August 2003, therefore assuming that the initiation process for this project started at least two years earlier. This assumption is based on the complexity of the project and negotiations required to secure funds and land.

There are five individual processes that collectively form the *Initiation Process*:

Determining the project goals is the process describing what it is that the project team is trying to do, accomplish, or produce. It is very important to understand what the end purpose of the project is and how to recognise when it has been accomplished. Goals should follow the S-M-A-R-T rule. They must be specific, measurable, accurate, realistic and tangible, and time bound. Documenting project goals in this manner will enable the project team to understand their projects' purpose and identify accomplished landmarks.

The Green Scheme has a goal to establish sustainable agricultural production in Namibia within 15 years, starting in 2006. The product will be tangible in the form of produce, the project's progress measurable in terms of phases complete and with the help of outsourced expertise realistic to achieve.

Determining project deliverables is the process where there are measurable outcomes, results or specific activities that must be completed before a project or phase can be considered as completed. Government approval of the Green Scheme Policy in August 2003 is such a deliverable. Without this activity completed, there would be no project.

Determining the project outcome is the process that is done in the form of a Project Overview Document, serving the purpose of "capturing the intended outcome of the project and its deliverables" (Heldman 2004:54). This document provides a background of the opportunity, the possible business opportunities as well as the business objective required to capitalise on this opportunity, forming the basis for "future consensus on deliverables and project expectations" (Heldman 2004:54).

Identifying project constraints is the process that can be viewed as one of the outputs of the initiation process. These constraints are either restrictive to the actions of the project team, or they dictate the actions of the project team. Apart from the aforementioned triple constraint combination of time, budget and quality, there are also schedule, technology, directive, and managing constraints. In the case of the Green Scheme project, environmental issues could be considered as a constraint. Given the required outcome of the project, it can be assumed that specific constraints regarding site establishment, earth works, and civil services like roads and water pipe lines to newly developed "personnel towns" will dictate the actions of various project teams. They will need to consider the restrictive guidelines when planning their project courses of action.

Documenting assumptions is the process where assumptions are considered as information relevant to the project, and the project team will presume these assumptions to be true, illustrating the importance of understanding and documenting assumptions. Omitted or incorrect assumptions can cause projects to fail, even after a lot of progress has already been made in the project. Most of these assumptions are made related to various stakeholders, on aspects such as delivery times, adequate performances from the team, accuracy of the project plan, project start phases. Assumptions must be validated as far as possible through written confirmations by vendors and stakeholders.

Biomist must not assume that the project will only require humidification plants, leading to the installation of pumps and pipes in horticultural greenhouses that can only humidify. There might be a requirement for chemical dissemination, where the stakeholders want a dual application for the mist spray, minimising occupational health risks for the farm workers that had to breathe in hazardous insecticides and chemicals when treating the plants in the past. This assumption could lead to increased costs or delayed time schedules if Biomist has to reinstall the correct

system. If however, Biomist can confirm the requirement of the project with validated assumptions, they can make sure to install the correct system from the start of that specific project phase, achieving the project goals in terms of time, money and quality.

The other processes of the *Project Management Process* are, as mentioned above, planning, executing, controlling and closing. These will now only briefly described:

Planning:
"Planning is the process of formulating and revising project goals and objectives and crating the project plans that will be used to achieve the goals the project wax undertaken to address" (Heldman 2004:22). This process also needs to consider and choose the best alternatives presented in order to achieve the project goals. The planning process forms the backbone of the project and the executing, controlling, and closing process groups all rely on the planning process for their inputs. It is clear that "Planning must encompass all the areas of project management and consider budgets, activity definition, scope planning, schedule development, risk identification, staff acquisition, procurement planning, and more" (Heldman 2004:23).

Executing:
This group of processes involves putting the project plans into action. "Project managers are the people responsible for managing the project processes and applying the tools and techniques use to carry out the project activities" (Heldman 2004:6). From this definition is clear how the project manager will use this process to coordinate and direct project resources in order to meet the project objectives. This process keeps the *Project Plan* on track, ensuring that future executions are in line with the project objectives. This group of processes utilises the most resources, including time, and will more than often cost the most, hence the conflicts over schedules that project managers need to deal with during this process.

Controlling:
In this process the checks and balances are put in place, measurements taken and evaluated to ensure that the project stays on the planned set course. Variances from the project plan are dealt with through corrective actions, re-aligning project activities to conform to the set project plan. It might require various passes through the planning process in order to realign with the objectives.

Closing:

This is a process group that must not be omitted from the *Project Management Process*. It brings a formal, orderly end to a project phase or the project it self. It is important because "all the project information is gathered now and stored for future reference" (Heldman 2004:23). These reference documents can assist future project teams, helping them to look out for possible danger areas. It is also during this process where formal acceptance and approval for the project is obtained from the stakeholders, establishing contract closeout.

PROJECT MANAGEMENT AS SYSTEM

The everyday use of the term "system" included in concepts such as "river systems, planetary systems, transportation and communication systems" (Nicholas 2004:52) and substantiates the statement of Robert M. Pirsig. He said that "there is so much talk about the system but yet so little understanding of the system itself" (PROJEK-H 2004:8). It is almost as if people do not have "respect" for the true complexity of an actual system and its functionality.

In addition to the accepted definition of a system as being "an organised or complex whole; an assemblage of things or parts interacting in a co-ordinated way" (Nicholas 2004:52), one can include three additional features of a system as the system *affecting* its parts, each part will change if they leave the system, the body or assemblage of the parts actually *does something*, and the body or assemblage of parts has a *specific interest*.

Through incorporating these additional features in the definition, a system can be perceived as "the whole being greater than the sum of its parts" (Nicholas 2004:52), and interpreted as *holism*. This is the opposite of reductionism where things can be understood by dissecting the situation to fragments and then focussing on understanding these segments or fragments independently. Assuming that the Green Scheme is a system, and then Biomist will be part of this system. This part will change if it operates outside of the Green Scheme system (not restricted to the constraints of the specific project), it actually does something (installation of critical phase components) within the system and it has a specific interest (success of the project) in the system. In view of this assumption, it seems that the Green Scheme can be considered a project that functions as a system.

There are various differences between projects used as systems, and projects implemented to create systems. These differences can be recognised by looking at a few common principles and concepts of a system. Firstly there are e*lements and subsystems* that are both parts of a system where the element is the smallest unit and the subsystem an independent unit, entirety functional, within a larger system. Prominent Paints (Pty) Ltd is an example of a manufacturing organisation that considers the production process a project, used in a system as an element of the company. The scheduling of inventory can be seen as a project implemented to create a system of inventory control thus becoming an element of the production system.

Secondly there are system a*ttributes* that are the distinguishing characteristics of all systems, subsystems and elements. These attributes can be employed as controlling tools and methods to measure system behaviour and performance.

Thirdly the system *environment and boundaries* are concerned with the parameters wherein the system can operate. The system is disconnected from the environment by its boundary, separating those variables over which management has no control, like environmental occurrences, from those that falls within their management profile within the system. The managers involved in the Green Scheme will have no control over ambient temperatures and humidity, but they will be able to control their resources to make living conditions more comfortable for their project teams.

Fourthly are the *objectives* for the project that are unmistakable and compact, acting as notable mechanisms to analyse the system. More than often, “objectives are broken down in to a hierarchy of objectives, each relating to a subsystem” (Nicholas 2004:55). An objective for Green Scheme is to create sustainable agricultural production, and where subsystems are identified as the establishment of the various produce like grapes and dates, collectively known as parts of the system of the Green Scheme project.

Fifthly is the *system structure* describing the relationship between all elements and subsystems of the larger assemblage. The success of any system is largely influenced by the appropriateness of the chosen structure. The main consideration would be between hierarchical and network structures. The project as a system would more than likely choose the hierarchical structure, whereas the project to

create a system would rather prefer the network structure because of its dependence on cross-functional inputs.

Systems actualise something or is a result through the *process of converting inputs to outputs*. This process depicts a predetermined end-result, the reason for the system to exist and function. Referring to the example of Prominent Paints (Pty) Ltd, the production process brings forth products with features and benefits and the scheduling of inventory project must create a system that would add value to the product, such as sufficient raw materials, sufficient warehousing and value adding logistical activities.

Sixthly there are system *constraints and conflicts* that are dynamic features in every system. These are limitations inhibiting the project teams to achieve their objectives and are imposed both from the environment and within the organisation. Conflicting objectives of functional subsystems are frequent within human organisations. The projects being used as systems will always face constraints in terms of time, quality and money, where the projects implemented to create systems will undoubtedly be influenced by cross-functional conflicts. Prominent Paints (Pty) Ltd had to manage the conflict between production, which had to meet a budget of required litres per month, and warehousing, which had to minimise labour and overtime costs, in order to fulfil the value adding objective. They decided to incorporate the management of these two functional areas into one department, operations, with its own director, eliminating cross functional conflict through integration.

THE SYSTEMS APPROACH TO MANAGEMENT RELATED TO THE SYSTEMS VIEW OF A PROJECT

There are distinct administrative viewpoints concerning the management of organisations. One of these viewpoints is the *systems approach* to management.

The *systems approach* was established through the evolution of the classical viewpoint starting in the early 1900s through to World War II. This viewpoint accepted the perplexities and indifferent associations that is part of management. It is an approach that recognised the necessity for managers to first be able to understand the dynamics of a system, and its relationship with the environment before they attempt to apply an appropriate action.

This approach meant that managers had to adapt to situations and use practical examples to assist in solving problems or identifying the best possible course of action. “The systems approach to management recognises that organisations exist in a universe of forces and are comprised of interrelated units, the goals and effects of which must be co-ordinated and integrated for the benefit of the organisation” (Nicholas 2004:9).

This approach is “a way of doing things, rather than just looking at them” (Nicholas 2004:64). As mentioned above, this system acknowledges the interdependency and cause-effect among all elements of the system; which gives the system its most distinguishable characteristic. This approach gives managers the ability to not only recognise the various elements within a situation, but to also consider their influences on the environment and anticipate the possible consequences of their actions.

It becomes very clear how this *systems approach to management* relates to the *systems view of a project*. Both have clearly defined objectives, are influenced by the environment and constraints of the system, they need resources to achieve goals and finally, both need to be managed with all the relevant principles applied.

Considering the three main characteristics of *systems management* being focused on *achieving overall system mission and objectives, optimising the overall system rather than subsystems* and thirdly, *focused on responsibility*. It is clear why managers in each functional subsystem are assigned specific tasks that need to contribute to the total system effectiveness and expected to produce measurable results.

The role of the project manager in systems engineering is invaluable. “Systems Management is the process of monitoring and controlling a system to ensure fulfilment of overall system objectives” (Nicholas 2004:78). Considering this process, *systems engineering becomes synonymous with project management, where both emphasise the integration of activities to achieve overall goals*. The project manager has the ability to co-ordinate the interactions between various subsystems and ensures that the necessary integration of cross-functional disciplines is achieved in order to reach the set objectives.

Assuming the project manager for the integration of the Prominent Paints (Pty) Ltd production and warehousing into one operations department, considered all the above mentioned factors, it is clear to see how much the two concepts of a *systems*

approach to management and the *systems view* to project management relate to each other. The integration of the two functional departments had a very clear objective, to eliminate cross functional conflict and to add value to the operational process, in so doing improving the overall system within the company, and requiring systems engineering to integrate cross functional activities in order to achieve overall company goals. The project manager presumably had to coordinate the cross functional interactions and ensure that the organisations' core function of paint manufacturing was not affected negatively.

Through achieving the set objectives of adding additional value to the operations department, and ultimately their customers, Prominent Paints (Pty) Ltd had "Closing" as the next step in the project management process, an output validating the phases of the *project life cycle* from initiation to closure.

When the Green Scheme reaches this phase, the same would be applicable to the consulting firms still involved. For Biomist which has its own objectives within the constraints of the project, achieving objectives could presumably be the successful implementation of the required system with comprehensive training for local operators, ensuring the sustainability of the humidification plants to support the Green Scheme beyond the project completion date.

When projects are divided into life cycle phases, it becomes easy for the project manager to initiate, plan, execute, and control the project. Considering the "infant phases" of initiation and planning, the manager will gain approval for the project, formulate project goals and determine the best possible courses to achieve project objectives. The intermediate phases of executing and control will help the manager to implement the project plan, allocate resources and act on measurable outcomes of the project phases, keeping them in line and true to the project plan. With the final phase or closing of the project life cycle, management can closeout the contract through formal acceptance and approvals from the stakeholders; giving accurate feedback to top management regarding the completion of the current project. They can also consider the redeployment of resources for a next project, maintaining the continuation of improvement, expansion or growth.

CLOSURE

Assuming that the Biomist proposal is accepted and the Green Scheme project comes to fruition, Biomist will have a unique opportunity to not only assist and contribute to the success of the Green Scheme project in Namibia, but also gain invaluable exposure and experience in the international arena. Biomist consultants will be part of various project teams consisting of highly qualified and experienced consultants from other international organisations.

This project will force Biomist to look past its current strategies and work towards different future strategies. “Determining the strategic direction of a firm involves developing a long-term vision of the firm’s strategic intent” (Hitt, Ireland & Hoskisson: 2003:395). Biomist’s management will need to balance the company’s short-term need, to have the right capabilities for the Green Scheme, with its long-term sustainability through focussing on its current and valuable core competencies.

Within the company itself, management would have to launch projects to maintain Biomist’s core competencies, employing resources and capabilities to retain a competitive advantage over local rivals in the mist application industry. As illustrated with the integration of cross functional activities, Prominent Paints achieved their goal to add additional value to their operational process for the benefit of their customers. Biomist can follow this strategy as an application of the systems approach in order to add value to the Green Scheme.

With a clear understanding and appreciation of the *systems approach,* and the effective application of the *project management process,* Biomist will be able to achieve its strategic intent of leveraging the company’s “resources, capabilities and core competencies to accomplish the firm’s goals” (Hitt *et al*. 2003:22). Biomist will also be able to fulfil the company’s strategic mission, “purpose and scope of its operations” (Hitt *et al*. 2003:23) for the Green Scheme project.

Projects are systems of people, equipment, materials and resources managed to achieve a goal and form the basis of this article, set out to illustrate the importance of and relevance between *projects as systems* and the *project management process.* Project managers that read this article will become aware of the interdependence of these two concepts, and how important they are in the *Strategic Management* of an organisation, influencing efficiency, core capabilities and ultimately sustainable competitive advantage.

BIBLIOGRAPHY

DIRECTORATE OF INTERNATIONAL TRADE. 2004. Trade Opportunities. [Internet: http://www. mti. gov. na /tradeopps_text/ list_reg_int_trade_fairs.htm]

HELDMAN K. 2004. Project Management Professional: Study Guide. 2nd ed. Alameda: SYBEX.

HITT MA, IRELAND DR & HOSKISSON RE. 2003. Strategic management: competitiveness and globalization (concepts and cases). 5th ed. Mason: Thomson South-Western.

NICHOLAS JM. 2004. Project management for business and engineering. 2nd ed. Oxford: Elsevier/ Butterworth-Heinemann.

PROJEK-H, Tutorial letter 101/0. 2004. See University of South Africa, Department of Business Management

SMIT PJ & CRONJÉ GJ DE J. 2002. Management principles: a contemporary edition for africa. 3rd edition. Lansdowne: Juta.

SOUTHERN DOMAIN. 2005. Online Travel Guide. [Internet: http://www.namibia-travel.net/namibia/people.htm; http://www.namibia-travel.net/namibia/history.htm]

TJARONDA W. 2005. Green scheme ready to roll. [Internet: www.newera.co.na/archives php? id=5297 &date=2005-01-27]