Citrus Business Management Programme

Module 9

Improve Your Business Performance

Learner Guide

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Scientific Roets

Citrus Growers' Association OF SOUTHERN AFRICA
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Contents

Directions

Unit Standard Information

Plan and manage production/operations in a new venture

SAQA US ID	UNIT STANDARD TITLE			
263434	Plan and manage production/operations in a new venture			
ORIGINATOR				
Task Team - New Venture Creation				
PRIMARY OR DELEGATED QUALITY ASSURANCE FUNCTIONARY				
-				
FIELD			**SUBFIELD**	
Field 03 - Business, Commerce and Management Studies			Generic Management	
ABET BAND	**UNIT STANDARD TYPE**	**PRE-2009 NQF LEVEL**	**NQF LEVEL**	**CREDITS**
Undefined	Regular	Level 4	NQF Level 04	6
REGISTRATION STATUS		**REGISTRATION START DATE**	**REGISTRATION END DATE**	**SAQA DECISION NUMBER**
Reregistered		2015-07-01	2018-06-30	SAQA 10105/14
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**		
2019-06-30		2022-06-30		

In all of the tables in this document, both the pre-2009 NQF Level and the NQF Level is shown. In the text (purpose statements, qualification rules, etc), any references to NQF Levels are to the pre-2009 levels unless specifically stated otherwise.

This unit standard replaces:

US ID	Unit Standard Title	Pre-2009 NQF Level	NQF Level	Credits	Replacement Status
114618	Monitor productivity in a business venture	Level 4	NQF Level 04	5	Complete
114588	Develop, implement and monitor a quality policy for a new venture	Level 4	NQF Level 04	4	Complete

PURPOSE OF THE UNIT STANDARD

This unit standard is for learners who are responsible for planning and managing production/operations function of a new venture. Learners acquiring this unit standard will be equipped with knowledge and skills to optimise productivity of a business.

Learners credited with this unit standard will be able to:

- Design a production/operations layout for a new venture.
- Apply effective production/operations scheduling.
- Apply resource management within a new venture.
- Apply quality management within a new venture.

LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING

It is assumed that the learner has the following knowledge and skills:

- Communication at NQF Level 3.

UNIT STANDARD RANGE

Production includes but is not limited to:

- Acquisition of raw material.
- Storage of raw material.
- Transforming raw material into marketable products.

Operations include but are not limited to processes involved in delivering a marketable service.

Plan strategically to improve new venture performance

SAQA US ID	UNIT STANDARD TITLE			
263456	Plan strategically to improve new venture performance			
ORIGINATOR				
Task Team - New Venture Creation				
PRIMARY OR DELEGATED QUALITY ASSURANCE FUNCTIONARY				
-				
FIELD			**SUBFIELD**	
Field 03 - Business, Commerce and Management Studies			Generic Management	
ABET BAND	**UNIT STANDARD TYPE**	**PRE-2009 NQF LEVEL**	**NQF LEVEL**	**CREDITS**
Undefined	Regular	Level 4	NQF Level 04	4
REGISTRATION STATUS		**REGISTRATION START DATE**	**REGISTRATION END DATE**	**SAQA DECISION NUMBER**
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This unit standard replaces:

US ID	Unit Standard Title	Pre-2009 NQF Level	NQF Level	Credits	Replacement Status
114585	Plan strategically to improve business performance	Level 4	NQF Level 04	4	Complete

PURPOSE OF THE UNIT STANDARD

This Unit Standard is intended for learners who are required to implement and monitor a strategic plan to improve the performance of a new venture.

Learners credited with this unit standard will be able to:

- Describe the concept of strategic planning in managing business performance.
- Explain the role of the various functional strategies in business performance.
- Apply business performance supervision and monitoring.
- Monitor, measure and report on business performance.
- Identify and rectify performance problems occurring in business.

LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING

It is assumed that the learner has the following knowledge and skills:

- Communication at NQF Level 3.

UNIT STANDARD RANGE

N/A

Using the Learner Guide

This learning material has been developed to assist the learner wishing to complete this unit standard. The guide contains all necessary learning to ensure that the learner will attain the competencies required by the unit standard.

The learner guide is accompanied by formative and summative portfolio of evidence (PoE) guides. Please ensure that you have access to these guides as well. The learner guide was designed to be used by a learner during the presentation of a skills programme based on the unit standard and to be kept afterwards by the learner for reference purposes. The PoE guides were designed to be completed during and after the presentation of the skills programme and forms part of the assessment process.

Background Information

The main theme of this module is management and leadership in terms of business strategic business planning, production management and day-to-day operations management functions.

It centres on the core management functionality and management sciences that are applied to improve and grow a business. Note that this module has been contextualised for agribusiness.

The module will cover aspects such as:

- Design of production / operations layout for agribusiness
- Effective production / operations scheduling
- Resource management within agribusiness
- Quality management within agribusiness
- The concept of strategic planning in managing business performance
- The role of the various functional strategies in business performance
- Business performance supervision and monitoring
- How to monitor, measure and report on business performance
- How to identify and rectify performance problems occurring in business

This module contributes to the exit level outcome and associated criteria:

5. Demonstrate an understanding of the role of leadership and management.

   5.1 Knowledge is demonstrated of how management and leadership principles are applied to improve business effectiveness and efficiency.

   5.2 Knowledge is demonstrated of the differences between leadership and management in terms of managing a business.

5.3 Knowledge is demonstrated of leadership and management styles in relation to their impact on business performance.

5.4 Leadership and management principles and techniques are applied in order to enhance business performance.

This module comprises of 2 unit standards and attracts 10 credits.

This module is aligned to unit standards:

Section 1	**Production Management**	263434	Plan and manage production / operations in a new venture	C	4	6
Section 2	**Strategic Planning for Business Improvement**	263456	Plan strategically to improve new venture performance	C	4	4

Learning Outcomes

This learner guide has the following learning outcomes:

Section 1 – Production Management

1. Design a production / operations layout for a new venture.
   1.1. Explain the concept of productivity in a competitive citrus production unit.
   1.2. Describe the production cycle of citrus.
   1.3. Give examples of the operational elements involved in running a citrus production unit.
   1.4. Use a production plan to schedule and optimise workflow.
   1.5. Analyse market potential and limitations to plan for the capacity needed to operate a citrus production unit profitably, including limitations such as expertise, capital (finance and infrastructure), equipment, and technology.
2. Apply effective production / operations scheduling.
   2.1. Explain the need for effective production scheduling within an agribusiness.
   2.2. Design an effective production system for specific areas of an agribusiness, including areas of scheduling such as workforce, ordering of stock and raw materials, deliveries and maintenance activity.
   2.3. Identify potential bottlenecks that may affect production flow and analyse them in order to take corrective action.
3. Apply resource management within a new venture.
   3.1. Explain the concept of resource management in an agribusiness, including resource management elements such as stock, raw materials, machines, equipment, buildings, capital and people.
   3.2. Develop a record-keeping system to effectively manage and control business resources.
   3.3. Design and develop a maintenance system to ensure sustainability of the business to perform competitively.
4. Apply quality management within a new venture.

4.1. Explain the fundamentals of quality management in terms of agribusiness.

4.2. Lay down quality principles in response to market requirements.

4.3. Design measurement tools to measure the quality of the product against a specific set of standards.

Section 2 – Strategic Planning for Business Improvement

1. Describe the concept of strategic planning in managing business performance.
   1.1. Describe the concept of strategic planning for an agribusiness.
   1.2. Explain the benefits of strategic planning and performance monitoring.
   1.3. Identify the aspects of a good strategic plan from examples.
   1.4. Evaluate the relationship between the timing of a strategic plan and the performance of the business unit.
2. Explain the role of the various functional strategies in business performance.
   2.1. Explain the elements of a strategic plan.
   2.2. Identify alternative functional structures in an agribusiness.
   2.3. Explain how key elements operate within each alternative structure.
   2.4. Give reasons for choosing a particular organisational structure for an agribusiness.
3. Apply business performance supervision and monitoring.
   3.1. Select and use a business performance monitoring tool.
   3.2. Evaluate supervision practices in the agribusiness.
   3.3. Evaluate the supervision of expenditure in the agribusiness.
   3.4. Analyse the marketing expenditure in accordance with the objectives of the agribusiness.
   3.5. Monitor the business progress and identify attributes that need development against a project plan.
4. Monitor, measure and report on business performance.
   4.1. Consider qualitative and quantitative performance indicators for your agribusiness.
   4.2. Measure financial indicators for your agribusiness and report on them.
   4.3. Monitor customer satisfaction with the produce of you agribusiness and report on it.
   4.4. Explain a variety of reporting lines within the agribusiness.
   4.5. Describe and document reporting priorities within the agribusiness.
   4.6. Document and report progress of the agribusiness, according to established procedures, within an agreed timeframe and format.
5. Identify and rectify performance problems occurring in business.
   5.1. Identify, record and notify stakeholders of potential problems in order to try and resolve them.
   5.2. Identify the symptoms of performance problems and identify possible root causes for them.
   5.3. Identify, select and apply appropriate problem-solving methods and techniques in order to solve business related problems.

5.4. Rectify performance problems within a set timeframe.

Note that the following critical outcomes are also developed and assessed in an integrated manner, as part of this learning module:

1. Collecting
2. Communicating
3. Demonstrating
4. Identifying
5. Organising
6. Science
7. Working

Keep these learning goals in mind throughout your work related to this module.

There is an opportunity for self-assessment and a progress check at the end of this learner guide. Make time to assess yourself and ask the facilitator, assessor, or your workplace mentor or coach for help if you are unsure of the answers.

Section 1: Production Management

Learning Goals and Pathways

In order to operate a citrus production unit effectively and profitably, you need to know and understand how to execute basic production and operations management functions. These functions will form the cornerstone of your daily business activities and will set the tone for your business's success or failure.

This section will help you to examine and understand some of the basic production and operations management functions and concepts that you require to manage a citrus production unit.

This section is presented in chapters 1 to 4 of the guide.

The learning goals for this module include:

1. Design a production / operations layout for a new venture.
2. Apply effective production / operations scheduling.
3. Apply resource management within a new venture.
4. Apply quality management within a new venture.

Chapter 1
Production Planning

The Concept of Production Management

Citrus originates from the sub-tropical regions of south-east Asia. In the wild, citrus trees in these regions produce fruit all year round, and the fruit are small, poorly coloured and blemished. In the absence of effective production practices, citrus trees do not produce fruit suitable for the market.

Citrus production is largely concerned with management of the practices and processes that manipulate the tree to produce high yields of marketable fruit. Production management, together with the selection of superior varieties and plant improvement, can be seen as an on-going effort to influence the natural tendencies of the tree.

definition

Production practices

Production practices are the actions and processes carried out to achieve production objectives, such as fertilisation, irrigation, pest and disease control, pruning and harvesting.

Production systems

Production systems are concerned with the production practices required to convert resources into the desired product, which in this case is a marketable citrus crop.

Production management

Production management is the management of production systems and production practices.

Production objectives

Production objectives are measured in terms of yield (volume), export percentage, number of export cartons per hectare, fruit size, and external and internal quality.

Production systems involve the use of a variety of production practices that are employed to produce a crop of the highest possible standard in terms of quantity, quality and size, in order to achieve production objectives. Coordinating the production systems requires effective production management.

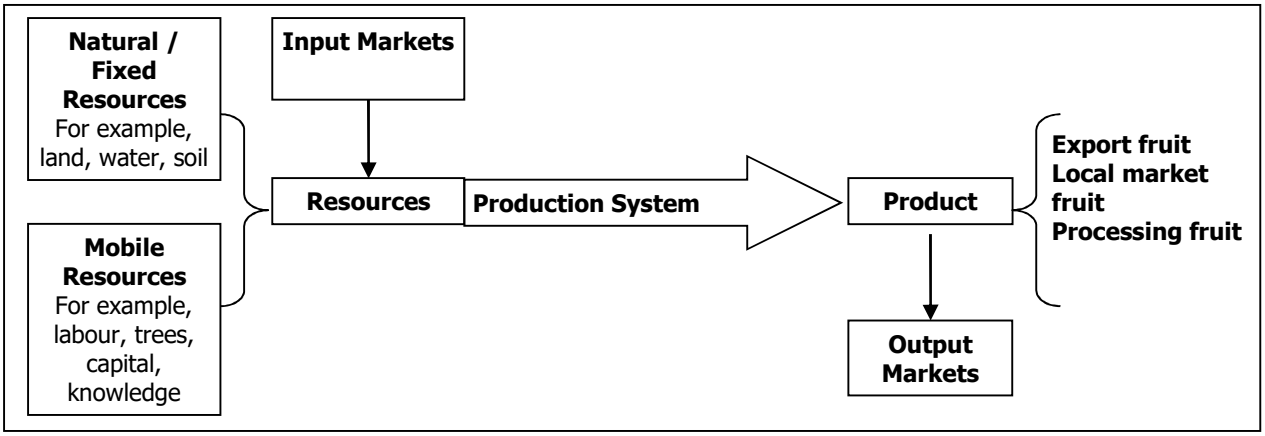


Figure 1.1: Production Conversion

Figure 1.1 demonstrates the conversion process involved in citrus production, where resources (inputs) are converted by a production system to a product, being citrus fruit (output).

Productivity Factors in a Competitive Citrus Production Unit

Market Demand

Consumers want the fruit of their choice to be available at all times. Fruit should look good, be unblemished, well-coloured (superior exterior quality), taste good (high interior quality) and be of the right size. At the same time, the citrus producer wants orchards that will provide high yields over an orchard lifespan of 18 to 30 years. On top of all this, the citrus orchard must be managed in such a way that production practices have the least possible impact on the natural environment. Commercial citrus production management is about achieving these objectives efficiently and cost effectively.

Planting

Citrus trees are planted in rows in orchards. The planting distance, also called tree spacing or placement, between rows and between trees within rows, is determined by numerous factors including climate, variety, and soil type. A typical tree spacing is 6m between rows by 3m between trees, meaning that 555 trees per hectare (ha) are planted (1ha = 10,000 m2).

Once planted, trees take three or more years before bearing fruit that can be marketed. Thereafter, per tree and per hectare yields steadily increase to 40 to 70 t/ha – depending on cultivar and variety – after a further 4 to 7 years. If the trees are well looked after, this level of production will remain fairly constant until trees start to decline naturally.

Yield

definition

Yield

Yield refers to the amount of fruit produced and can be expressed in terms of:

Tree yield	kg per tree	kg/tree
Orchard yield	tonnes per hectare	t/ha
Export yield	15kg carton equivalents per hectare (10kg carton equivalents for soft citrus)	cartons/ha

Economic Lifespan

The average economic lifespan of a commercial citrus orchard varies between 18 and 30 years and can be as high as 30 to 60 years in hot, dry areas. Citrus is therefore viewed as a long-term crop. For citrus production to be profitable, the orchard must produce high yields of quality fruit every year, and do this consistently over a long period of time.

In citrus production, the challenge is, therefore, to make production decisions and take actions to ensure high annual production of marketable fruit while ensuring that these decisions and actions contribute to the long-term sustainability of the orchard.

Production Cycle of Citrus

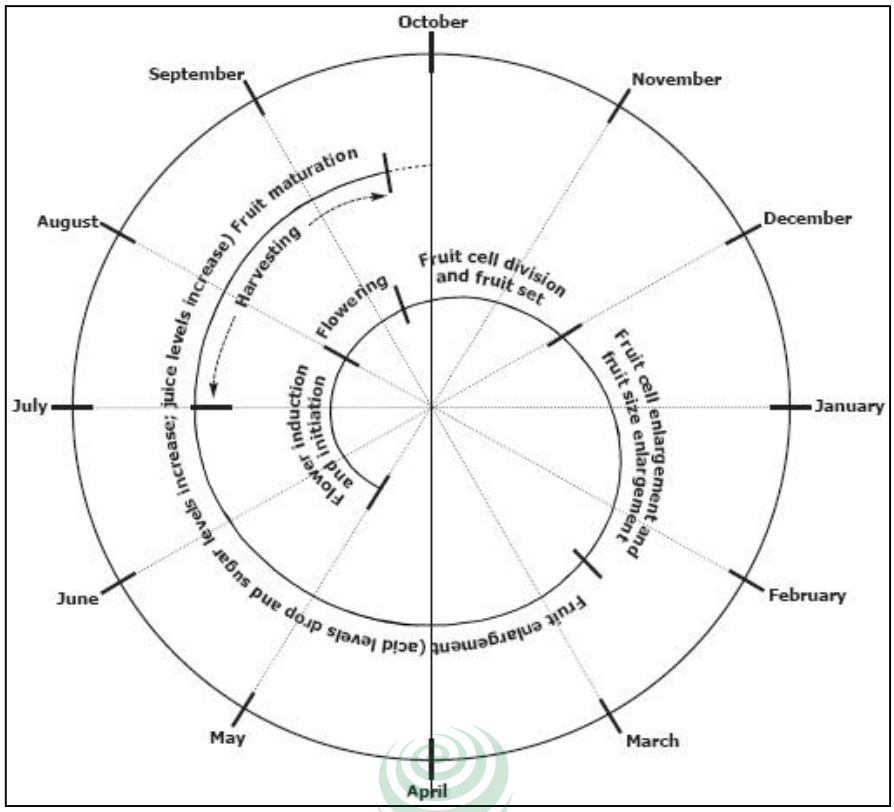
definition

Phenology

Phenology refers to regularly recurring biological phenomena and the environmental and climatic factors that influence them. In citrus, phenology specifically refers to the annual cycle of the citrus tree.

Understanding the phenology of the citrus tree is essential to understanding the reasoning behind many of the practices and actions employed in citrus production. For example, the timing of fertiliser applications is linked to the phenology of the tree, with most fertilisers being applied at appropriate times to optimise flowering, fruiting, fruit development and fruit maturation.

The figure and table below set out the annual cycle of the citrus tree with regard to fruit production. Please note that this figure and table reflect the approximate flower and fruit development cycle of a Valencia orange tree and that the phenology of various cultivars differ.



Stage	Description	Time Period
Flower Induction and Initiation	Flower initiation is the induction and differentiation of vegetative buds into flower buds at a cellular level, and cannot be seen with the naked eye.	May to July
Flowering	Flowering or "bloom" is when blossoms appear on the tree.	August to Mid-September
Cell Division and Fruit Set	Cell division is the period when cells making up the fruit increase in number. Fruit set is the period from flowering or "bloom" until the end of fruitlet drop, after which the final fruit load is determined.	Mid-September to November
Cell Enlargement and Fruit Growth	Cell enlargement is the period during which cells making up the fruit increase in size. Fruit growth is the period during which the fruit grows and develops.	December to Mid-February

Stage	Description	Time Period
Fruit Maturation and further Fruit Growth	During this period fruit enlarges further and matures internally, meaning that the flavour, sugars and acids reach their optimum levels.	Mid-February to September
Harvest		July to September

It is important to note the term citrus season refers to the period from when flower initiation begins to the harvest. The season is generally from the beginning of August of one year to the end of July of the next year, although harvesting may extend to September and October for late cultivars.

Operational Elements of a Citrus Production Unit

Citrus Production units (like all agribusiness), are complicated and multi-faceted. There are a wide variety of skills and competency elements involved in all the operational elements of managing this kind of business.

Operational Element	Description
Enterprise Selection, Planning and Establishment	Concerns itself with identifying the various components of an agricultural enterprise, and with the selection and planning processes for a new enterprise, and looks at the physical layout of a farm, with specific reference to infrastructure and orchard layout.
Propagation	Concerns the various methods and requirements for the multiplication of plant material of specific varieties that possess desired qualities.
Crop Establishment	Concerns the establishment of a new citrus orchard, in terms of the physical planting of trees and the care for young trees.
Plant Structures and Functions	Considers the structure and function of various plant parts and the manner in which nutrients, water, air and sunlight is taken up and processed.
Plant Nutrition and Soil Management	Concerns itself with plant nutrients, in terms of the requirements of the citrus plant and the supplementation of nutrient elements through fertilisation, with specific reference to the timing and manner of application.

Operational Element	Description
Water Quality	Considers the various factors that influence water quality and manners in which water quality can be measured and controlled. Furthermore considers the effect of water quality on tree and fruit growth and development, in combination with effective irrigation, fertilisation and pest control.
Plant Manipulation	Concerns various types of physical and chemical plant manipulation, with specific reference to pruning, girdling and the application of plant growth hormones, and tools and equipment used for this purpose.
Irrigation	Looks at the technical aspects of orchard irrigation, with reference to the types of irrigation systems, the installation of new irrigation systems, and the repair and maintenance of an irrigation system. Also, concerns irrigation scheduling and measures to ensure effective irrigation.
Pests, Diseases and Weeds	Concerns the identification of pests, diseases and weeds that threaten citrus production. Also, considers various methods of effective control, and the planning required for this purpose.
Crop Protection	Looks at the practical application of crop protection agents through various methods, with specific reference to tools and equipment used, and health and safety requirements.
Food Safety	Concerns the requirements in terms of health and safety, and environmental control for ensuring food safety and hygiene.
Harvesting	Looks at the process of determining fruit maturity through maturity indexing, the harvesting of fruit, and the tools and equipment used for this purpose.
Conservation	Considers the impact of farming practices on the environment, with reference to the measures required to minimise this impact and protect the environment.
Marketing	Concerns the factors influencing citrus marketing, and the development of an effective marketing plan.
Production Management	Concerns the actions and processes involved in effective production management, with specific reference to the coordination of the various production tasks and processes and the creation of a strategic plan for the enterprise.
Industry Overview	An overview of the citrus industry and the various institutions involved.

Operational Element	Description
Packhouse Practices	Concerns the specific principles and practices that are employed in packhouse environments, specifically: • Receiving • Sorting • Grading • Fruit Sizing • Cold Chain Management • Packing • Palletising • Storage • Dispatch • Fruit Markets • Fruit Quality • Fruit Treatment • Health and Safety • Hygiene • Product Characteristics

Using Production Plans and Calendars to Schedule and Optimise Workflow

In citrus production, it is common practice to use production plans and calendars to schedule and optimise workflow.

The production cycle is related to the growth stages of the tree as set out in below. Please note that the approximate phenology of a Valencia orange tree was used to develop the production cycle that is reflected in this table, and that the phenology of various types and cultivars of citrus fruit can differ slightly.

Month	Cell Processes	Fruit and Flower Development	Production Processes					
			Fertilisation	Pest and Disease Control	Irrigation	Pruning	Harvesting	Packing
July	Flower Initiation	Flowering						
August	Cell Division							
September								

Month	Cell Processes	Fruit and Flower Development	Production Processes					
			Fertilisation	Pest and Disease Control	Irrigation	Pruning	Harvesting	Packing
October		Fruit Set						
November								
December	Cell Enlargement							
January		Fruit Growth and Maturation						
February								
March								
April								
May								
June								

The Annual Production Cycle for a Valencia Orange

Reporting and Recording Observations and Actions

The size and quality of the fruit at harvest is determined by a large number of factors. Each of these can cause a poor size or quality fruit which will eventually result in lower income.

It is, therefore, important to observe and record all factors which can influence the outcome. A system of recording all these factors must exist on every citrus farm. Record-keeping is a way of monitoring external and internal factors, as well as procedures which can influence the outcome of the production process.

It is important to develop a formal record-keeping system which is kept up to date and can be referred to at any time. It should be designed in such a way that the information will also conform to GAP norms.

GAP certification and registration has become a requirement for exporting fruit to most countries. In order to be certified and registered farmers should be able to demonstrate their commitment to:

- Maintaining consumer confidence in food quality and safety.
- Minimising the detrimental impact of farming practices on the environment, whilst conserving nature and wildlife.
- Reducing the use of chemical crop protection products.
- Improving the efficiency of natural resource use.
- Ensuring a responsible attitude towards worker health and safety.

The record-keeping system must be such that it is possible to trace back fruit received on the market to its origins, meaning to where it was produced in the orchard. All the production processes and actions employed in the production of the fruit must be open to scrutiny.

It is important that all employees are aware of the importance of recording all the necessary actions and observations during the production process, as well as why the

information is necessary. Actions and observations that must be recorded include the following:

- Blossom dates of all cultivars
- Weather data
- Irrigation scheduling
- Details of fertiliser applications
- Details of pest and disease control application

Blossom Dates

Blossom dates vary from year to year and influences phenological development of fruit up to the time of harvest. Comparing the date of full blossom with those of previous years is an indication of the picking date relative to the previous years and can be utilised in planning the harvesting and picking process. Spray recommendations quite often also refer to days after full bloom.

Weather Data

Weather data includes:

- Rainfall
- Daily maximum and minimum temperatures
- Humidity
- Evaporation

Analyses of trends in weather data are used to determine fruit growth patterns, which indicate the fruit size spectrum at harvest. This information is used in crop prediction and plays an important role in marketing, as the markets vary in their fruit size preferences.

Irrigation Scheduling

The irrigation manager prescribes the irrigation scheduling. The actual implementation of the planned scheduling must be recorded to ensure that scheduling was complied with. Irrigation reports also include details of problems that may have been encountered with the irrigation system.

Fertiliser Applications

This information is utilised in combination with production statistics to formulate the fertiliser recommendations for each year. It must also be available for inspection for qualification under the GlobalGAP system. All instructions to employees indicating the time of application and quantities must be given in writing and the actual application per orchard must be recorded as one of the requirements for traceability.

Pest and Disease Control Application

All details of the pest and disease control programme must be recorded for GlobalGAP qualification. This should include verification that the person recommending the programme is qualified, all instructions to employees, safety precautions, and training records.

Market Potential and Limitations to Plan for Production Capacity

Inputs (resources) are obtained from input markets, while products are sold in output markets. The production manager stays on top of the latest developments in input markets by consulting technical extension officers, attending study group meetings, and reading appropriate magazines and journals.

Knowing the output market is essential. The requirements of consumers, wholesalers and retailers (market demand) determine many of the decisions that are taken in respect of production practices. Getting the highest possible return for the citrus that is produced will ultimately determine the commercial success of the farming operation.

In South Africa, about 60% of commercially grown citrus is exported as fresh fruit. Of the balance, about 25% is sold on the local market and 15% is sent for processing at juice factories. Yet over 90% of total revenue is generated from exports. For this reason, production practices are geared toward maximising the export pack-out percentage and export cartons by ensuring that the requirements of foreign consumers are met.

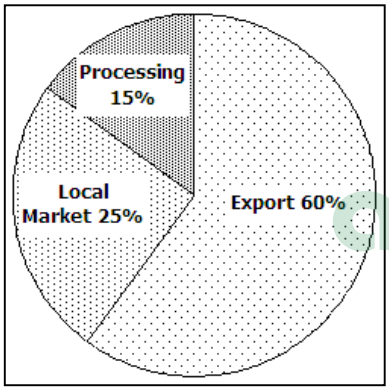


Figure 1.2:
Citrus Sold per Market Segment

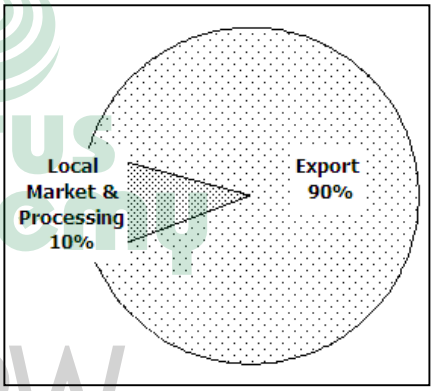


Figure 1.3:
Income per Market Segment

definition

Export pack-out percentage

Export pack-out percentage means the percentage of total fruit produced that can be exported. If a total of 1,000 tonnes are produced and 600 tonnes (40,000 15kg cartons) are exported, then a 60% export pack-out percentage is achieved.

A production manager must ensure that he stays on top of all the latest developments on the international market. This information drives the decisions he takes regarding all aspects of production, from cultivar selection to the selection of chemicals, to the timing of the harvest. All these decisions are strongly influenced by market demand. Increasingly, the higher paying markets are insisting that producers demonstrate their knowledge of and compliance with environmental regulations. These regulations are in some cases legally enforceable and in other cases set as entry requirements to output markets.

Good agricultural practices (GAP) regulations aim at meeting consumers' needs for products that are of high quality, that are safe to eat, and that are produced in an environmentally and socially responsible way. Producers who apply GAP would minimise the use of chemicals to prevent harming the natural environment. This process is commonly known in the industry as integrated crop management.

Natural Resources

Resources include those inputs that are fixed in relation to a particular site, such as land and water. These are known as natural resources, while mobile resources include labour, capital, trees and knowledge. (Refer to figure 1.1.)

Natural resources are, by definition, limited. More land or more water cannot be produced, and available natural resources must, therefore, be treated with respect if the farming operation is to be successful. The availability of these resources to meet the long-term needs of the enterprise is of critical importance.

The potential of a certain site for citrus production depends on its climatic suitability for the varieties to be grown and the status of the fixed or natural resources, specifically the availability of sufficient, high-quality water and suitable soil. All resources come at a cost and the scarcer the resource, the higher the cost. Land and water are scarce, expensive, and have to be used efficiently.

Only about 13% of South Africa's surface area can be used for crop production, which is referred to as arable land. Only 22% of this area is considered to be high-potential arable land. Suitable land is the primary fixed resource and without it, nothing can be produced. Land is suitable for citrus production if it:

- Is of sufficient size to support the required plantings
- Is located in the right climatic area to support desired varieties
- Is located in the right climatic area to result in low pest and disease pressure
- Has sufficient areas of soil of the required type and quality
- Has a sufficient supply of high-quality water
- Is located close to sources of skilled and unskilled labour
- Is not too far from packing and transport facilities

Production Practices and the Environment (Natural Resource Management)

It is not possible to produce a citrus crop to meet market specifications without applying certain practices or interventions. This is because the planting of large areas of a single crop upsets the natural balance in the first place. The farmer finds himself in competition with nature. A source of food which did not exist before is created for various pests and diseases. Furthermore, citrus trees have to be manipulated in various ways to bear high yields of uniformly sized fruit of the desired quality. The challenge facing the production manager is therefore to:

- Achieve yield targets
- Ensure the products meet market quality specifications
- In such a way that the process is sustainable

- Within the framework of Good Agricultural Practices

Environmentally speaking, therefore, production must be managed in such a way that the processes can be used repeatedly throughout the lifespan of the orchard and beyond. This is achieved by minimising the use of harmful production practices and applying those that have minimum negative impact on the environment. Examples of such production practices include:

- Selecting varieties best suited to the environment and climate
- Using certified nursery trees
- Using pesticides with minimum impact on non-target insects
- Minimising the use of soil tillage equipment
- Accurate and targeted use of fertilisers
- Responsible use of water

Production practices are costly and some, especially broad-spectrum pest and disease control treatments, inorganic fertilisers and herbicides, can contaminate soils and run-off water. This causes pollution of the environment and reduces populations of beneficial insects.

Production practices should, therefore, be carefully managed to achieve the desired production objectives with minimal harmful effects to the environment.

Optimal Usage of Resources and Optimisation of Outputs

Resources, which as mentioned above include both natural and mobile resources, need to be deployed in an effective manner. This means avoiding wastage, duplication and incorrect resource application and timing. For example, water, which is a scarce resource, should be applied at the right times and in the right amounts. To achieve this may require that other resources, such as the soil, be properly selected and prepared and that the labour – another important resource – used to apply the water be adequately trained.

Resources can also be underused. For example, the establishment of a new a citrus orchard requires adequate capital to be available for the purchase of high-quality trees, an effective irrigation system and the required equipment. Capital is a resource which, if not available in a sufficient amount, can lead to an under-capitalised venture and ultimate failure.

In addition to the effective use of resources, appropriate systems, processes and procedures, that enable the achievement of highest income at the lowest cost, must be put in place. The highest income is achieved when resources are cost-effectively applied to optimise orchard production and, in so doing, also enable the greatest possible proportion of fruit to meet the demands and requirements of the best-paying markets, in this case, the export market.

Generic Business Factors to Consider

Other factors to consider would be:

- Expertise
- Capital (finance and infrastructure)

- Equipment and technology

The Need for Effective Production Management and Production Systems

Managing a citrus production unit is similar to managing a complex project, in that the following steps must be followed:

- Define, understand and clearly state the overall goal or objective of the operation or project, for example, define the standards to which the end product has to comply.
- List the actions needed to achieve the end result, including naming the individuals who are responsible for the work and the deadline dates the various tasks have to be completed by.
- Define ways of evaluating and measuring progress and use results of this constant review process to influence future planning and operations.

The basic managerial tasks that are required to execute these steps are:

- Setting objectives
- Planning
- Scheduling
- Organising
- Implementation
- Coordination
- Monitoring

Successful citrus production management depends on the effective application of standard management principles and practices. This chapter identifies these aspects, defines them and describes their key features.

Setting Objectives

Setting objectives is concerned with the "what" of the farming operation, meaning finding answers to the question "What do we want to achieve?" Some goals and objectives that apply to citrus production were discussed in chapter 1. In summary, the citrus production manager is faced with a variety of challenges the most important of which are to:

- Achieve per hectare yield targets – This means that the production per hectare must achieve the targets that have been set in the annual budget. Annual targets for mature trees could vary from 30 to 60 tonnes/ha, and depend on the age of the orchard, the cultivar being produced, and other factors relating to the production site.
- Ensure the end products meet market specifications – The production manager must for example set production objectives to achieve the requirements of the markets in terms of size, colour and internal quality.
- Ensure that the process is sustainable - This means ensuring that the environment is not adversely or unnecessarily disturbed by the production

processes, for example by pest control chemicals and fertilisers, so that high levels of production can be sustained over the lifetime of the orchard.

- Remain within the framework of Good Agricultural Practices (GAP) – GAP calls for care in the use of chemicals to ensure safety for all operators, the use of pesticides, fungicides and fertilisers in a systematic, careful and planned way, and the judicious application of water to prevent wastage, contamination and erosion.
- Secondary objectives may apply to individual farming operations, but meeting the objectives stated above will ensure the overall success of the operation.

Planning

definition

Planning

Planning means to formulate a scheme, programme or method to accomplish a specific goal, within a specific timeframe, and with a specific purpose in mind.

If goals are long-range, meaning that it will take more than a few years to achieve, or strategic, meaning that they apply to the farming operation as a whole, the planning involved in achieving these objectives will likewise be long-range and strategic in nature.

If, on the other hand, goals are short-term, such as applying fertilisation before a certain date, a short-term operational plan or action plan is required.

Planning is concerned with thinking through, and when necessary, listing the steps and actions required to progress from the present situation to the desired situation.

We plan our everyday activities automatically, such as getting up and dressing in the morning. However, when it comes to more complex actions or tasks we have to put more effort and care into planning.

For example, fixing a roof leak requires as a first step, a plan. This plan will include how it will be fixed, what tools and materials are required, where these must be obtained, who will be responsible for overseeing the process and who will do the actual work, what sequence the process should follow, the costs involved, and by when it should be completed.

Planning, therefore, concerns the how, where and when of any operation or task we may perform, before we perform it.

Without planning there would be no step-by-step sequence of actions taking us from where we are to where we want to go. Our actions would be random and we would waste time, energy and money in repeating certain steps and leaving out others while compromising our chances of reaching our goal.

In the process, we could do things that threaten the future of the business and harm the environment.

Scheduling

definition

Scheduling

Scheduling is a management term that involves entering or drawing up a timetable for the completion of various stages of a complex project, or the coordination of multiple related actions or tasks into a single time sequence. Scheduling is most commonly used with regard to repetitive tasks, such as the application of irrigation water.

A schedule indicates the intervals between, or frequency of, actions. For example, a class timetable shows when different subject lessons will be held and the intervals between similar lessons. In the same way, a bus roster shows the regular arrival and departure times of buses. These are different kinds of schedules.

In citrus production, irrigation applications are scheduled, meaning that they take place at pre-determined times or frequencies. Similarly, spray applications are sometimes scheduled on a calendar basis, for example, every two weeks or once a month.

Scheduling is important because it provides the manager and his staff with a fixed programme for carrying out required actions or tasks. Once a schedule to an action has been set and communicated, the expectation is that it will be strictly kept to.

Organising

definition

Organising

Organising means to arrange tasks into an orderly functional, structured, coherent and systematic manner to bring about harmonious or united action.

Proper organisation means that different resources for a specific task are available when and how they are required.

For example, consider the planting of a new citrus orchard. The production manager has to ensure that all the necessary resources for this operation are available in the condition and at the time they are needed.

Part of the labour force would be allocated to preparing the orchard layout, while another would install the irrigation system, and a third group would be unloading the nursery trees from the truck.

In all cases, the manager has to ensure that the labour force has the right equipment to carry out their tasks effectively. At the same time, the manager has to ensure that he has allocated his capital effectively between the different parts of the planting programme.

Clearly, effective organisation has to be preceded by good planning.

Implementation

definition

Implementation

Implementation is the act of carrying out the agreed plan according to an agreed schedule to achieve what has been agreed should be done.

As discussed above, a plan cannot be effectively implemented unless the necessary resources are available. It is equally important that the required infrastructure be in place. Infrastructure is a term that refers to permanent non-consumable items required to support the implementation process. This includes roads, rail and air links, equipment, tools, vehicles, fuel supply depots, vehicle maintenance facilities, chemical supply points, offices, storage rooms, pump houses and packhouses. The production manager ensures that the necessary infrastructure is in place, and makes the appropriate contingency arrangements when such facilities are not yet available.

As circumstances and conditions change, the implementation process has to be constantly measured, evaluated, reviewed and adapted.

Coordination

Most tasks and almost all projects involve the activities of more than one person. Production management by definition is a process, the various aspects of which are carried out by different individuals with different skills.

We have already dealt with the concept of organising, which is about the allocation of resources. Coordination is about bringing in the various players at the appropriate times and in the most effective way in pursuit of the agreed objective. Most projects and tasks require some form of coordination. Without it, aspects of the work could be unnecessarily repeated and others lost.

According to Mind Tools, there are three basic coordinating mechanisms:

- Mutual Adjustment – This is a mechanism of coordination where nobody knows ahead of time exactly what they are going to do due to unpredictable circumstances. It is, for example, what two or more paddlers will do when they are rowing a boat through rapids.
- Direct Supervision – This method achieves coordination through one person taking responsibility for the work of others by issuing instructions and monitoring their actions.
- Standardisation – Here coordination is done in the planning stage, or on the drawing board. It involves groups working together to standardise the components of a product or service. It is through this kind of coordination that medical, law and business schools produce workers that do things in the same way.

Coordination is an important aspect of the citrus production manager's job. In fact, virtually all that gets done by the staff in the production process is the result of the coordination of different tasks or inputs. For example, the application of a pest control spray requires that the production manager coordinates with the administration

personnel to ensure that the chemicals are ordered and delivered in time, the maintenance department to ensure that the tractors and spray equipment are in good working order, and the labour force to ensure that enough workers are available to complete the task.

Monitoring

It is not enough to plan, organise and implement a programme. The process can only operate successfully when the feedback cycle is also operating. The feedback cycle involves:

- Control
- Feedback
- Adaptation
- Correction

The feedback cycle is a continuous process of measuring progress and evaluating it against the original objective(s). It is about asking:

- "Are we still on track?"
- "Are my original assumptions still valid?"
- "Do I need to adjust my goals, timeframes or implementation process in some or other way?"

The feedback cycle must be formalised and must form part of the procedure for executing tasks. It may involve the use of short interval control measures. A short interval control measure is a progress check on a regular short interval basis, such as weekly or fortnightly.

One way of doing this is to break down the programme into smaller short-term milestones and measure progress against these milestones on a scheduled basis. If any of the milestones is not met, a decision has to be taken on whether the implementation of the plan needs to be changed or whether the original plan needs to be adapted or corrected. The effectiveness of a pest control programme can, for example, be monitored by carrying out frequent and systematic orchard inspections of pest populations. Based on these results the programme can be adjusted to ensure that the original objective is met.

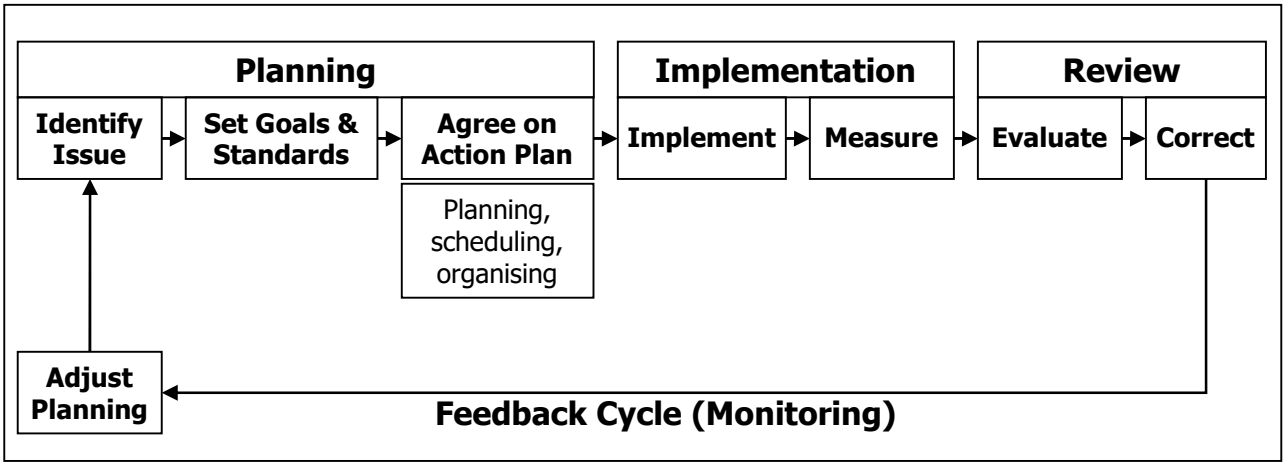


Figure 1.3: Management Process Chain

Figure 1.3 illustrates the management process chain, incorporating all the stages through to feedback and correction.

Effective Production Systems for Agribusiness

We can thus conclude the following key points when considering effective production systems for agribusiness:

- Production systems are about using production practices to convert resources to products that are acceptable to the market, in other words, to achieve production objectives.
- Production management is about coordinating production systems.
- Meeting market requirements consistently ultimately determines the success of the farming operation. The export market is the most important in citrus production.
- Resources are either fixed (natural) or mobile.
- Fixed resources are expensive and limited.
- Citrus farming implies being in competition with nature, and agricultural practices must always be such that it has a minimal impact on the environment, while still achieving the required yield and quality targets.
- Resources, especially limited natural resources must be employed optimally.
- In order to design an effective production system for your agribusiness, you need to analyse the following factors very carefully and ensure you optimise control procedures, manage implementation, and minimise waste:
- Cost and availability of the workforce, and how skilled they are in:
  - Ordering of stock and raw materials
  - Deliveries and storage
  - Maintenance activities

practical

Complete the following formative assessment:

F263434.1 – Team Research Presentation

Chapter 2
Effective Production Scheduling

The Need for Effective Production Scheduling in Agribusiness

In simple terms, scheduling involves deciding in advance when work will be performed. Planning determines what needs to be done. Scheduling puts the planned actions to a timeframe, indicating when a task has to be performed or completed.

It is an essential tool for managing and implementing processes and actions such as fertilisation, irrigation, and pest and disease control. It is also used to formalise the sequence of events that need to take place for the execution of a project or programme.

However, the scheduling process is not only about what will be done when. It also involves aspects such as:

- Who will perform the work
- Where will the work be performed
- What resources are required
- How will progress be measured against the scheduled work
- How will progress be reported on

Scheduling can be used as the basis for both the management of a specific project, such as the establishment of a new citrus orchard or to enable a repetitive action, such as irrigation, to be carried out effectively.

In both cases, the design and implementation of schedules may involve individuals from different parts of the operation.

example

Scheduling

On a large citrus estate deciding on the ideal irrigation schedule could require inputs from:

- The horticulturist, to indicate the water requirements of the specific planting.
- The soils and fertilisation expert, to indicate the physical and chemical features of the soil and thus the advisable range of water application rates.
- The irrigation engineer, to indicate the capability and capacity of the system to deliver the desired water application rates.

Similarly, an effective pest and disease control programme would require agreement from various specialists and managers regarding the operations required, by when and by whom.

The output of such a schedule would be the required tasks listed in sequence and set to specific dates. Thus irrigation regimes, pest and disease control programs, and manufacturing projects all have one important thing in common: the need for scheduling.

The agreed schedule, including details of what, when, how and where, has to be communicated clearly and concisely to all those concerned with its management and implementation. This is formalised using an appropriate scheduling technique.

Different Scheduling Techniques

A scheduling technique is a tool used to facilitate the scheduling process. Most recognised and frequently used scheduling techniques have their origins in the manufacturing and logistics industries.

Whenever projects are undertaken, for example, to investigate and produce a report, install a system, manufacture or assemble products, or move them from one place to the next, a clear step-by-step process needs to be designed, communicated and executed.

Depending on specific needs and circumstances, the manager selects the most appropriate scheduling technique for a particular project.

Before selecting the scheduling tool, the project's information must be assembled in a certain way. The required information includes:

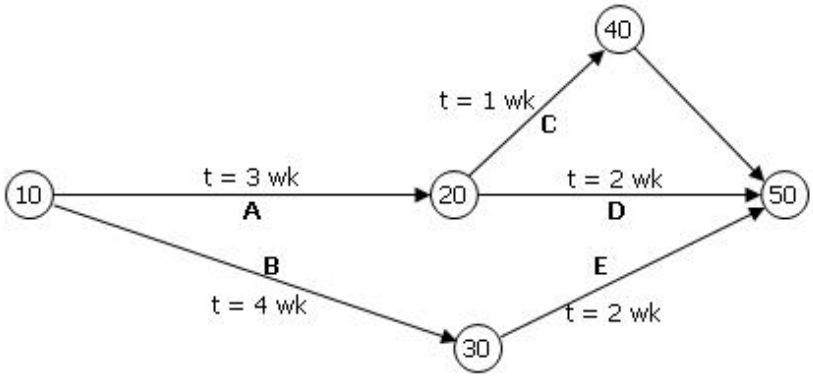
- The project start date
- The completion date
- The scope of the project, meaning what it includes and excludes
- The tasks, in the order in which they might be accomplished, by project phase
- An estimate of the personnel required and available for the project
- The interim milestones or interim deadline dates set for the project
- The project control or review points

The project manager would then decide which scheduling technique to use. There are a few to choose from, of which the most common are the following:

- Flow charts or process charts can be used, but do not normally include a timeframe and are thus not truly schedules.
- Milestone charts are used to determine the overall status of each major project. It is however not a good schedule methodology for the day-to-day monitoring of work effort at the detail level.
- On Critical Path Method (CPM) charts the critical path, representing the key activity, is drawn along a timeline with the tasks associated with it indicated alongside.
- Programme Evaluation and Review Technique (PERT) charts are used for complex projects requiring a series of activities, some of which must be performed in order and others at the same time. PERT charts are normally drawn on ruled paper with the horizontal axis indicating time period divisions. Each arrow, or diagonal, represents an activity that has to take place, or links to another activity that has to take place, to accomplish the end goal.

example

PERT chart



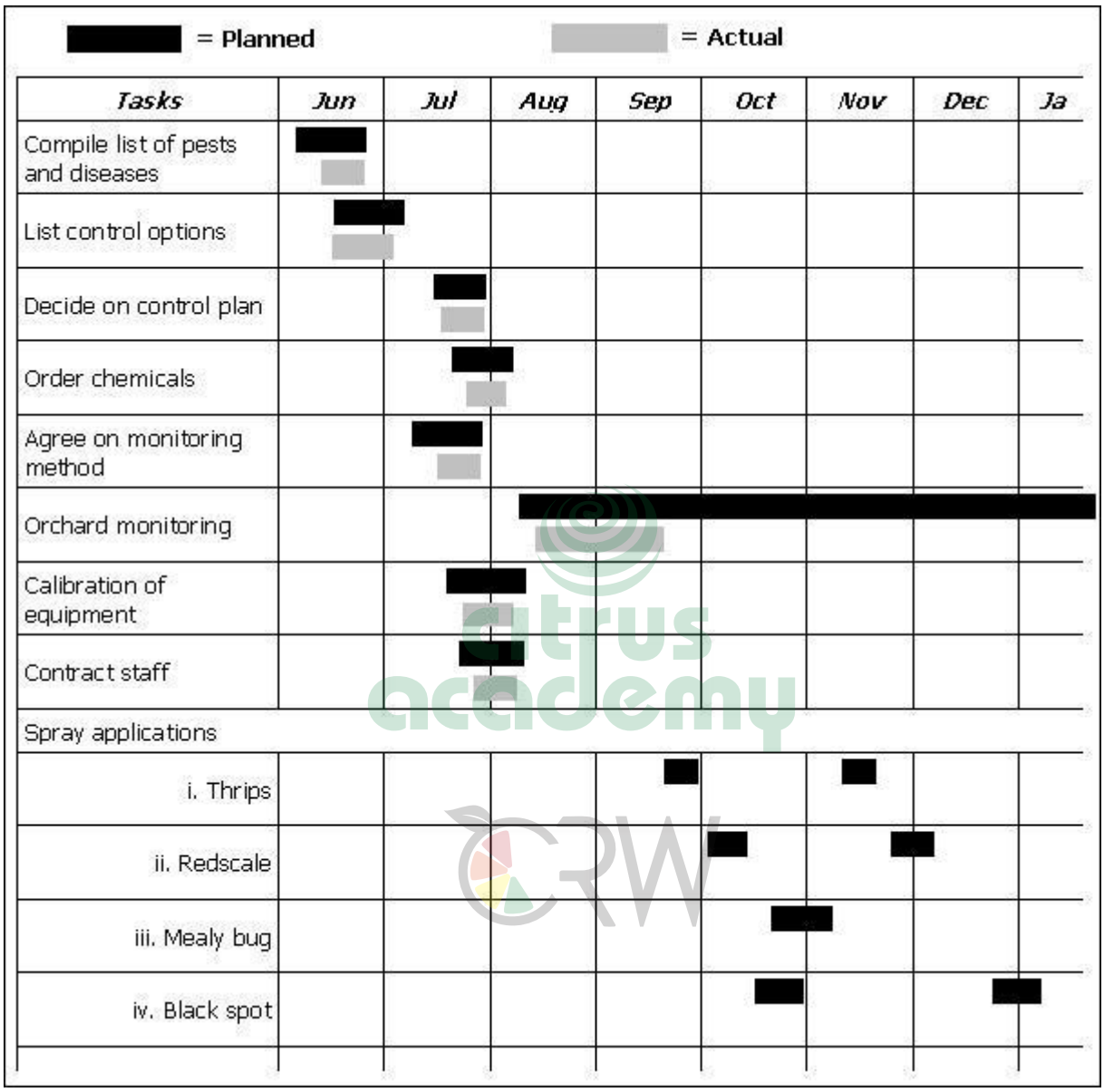
- The milestones are numbered **10**, **20**, **30**, etc.
- **t** denotes time in weeks for each activity
- **A**, **B**, **C**, etc. denote activities

❖ Gantt charts are bar graphs that help plan and monitor project development and resource allocation on a horizontal time scale. An example of a simple Gantt chart for pest and disease control is shown in the example below. Gantt charts can also be used to indicate:

- The relationship between tasks planned and actual completion dates
- The cost of each task
- The person(s) responsible for each task
- The milestones in the development of the project

example

Gantt chart



Note: In this example, the chart is being evaluated near end September and indicates the progress that has been made with the various planned tasks.

The production manager's task is to consider the overall production plan and, where necessary through using such tools as Gantt charts, ensure that the allocation of resources and the implementation of the plan occurs effectively (that the right things are done), efficiently (that the things are done right), and on time.

Forward and Backward Scheduling

Schedules can be created in two ways, being forward and backward scheduling.

Forward scheduling calculates schedules forward from today to project the completion date. For example, if a citrus packhouse is to be built during the off-season, it may be appropriate to start at today's date and plan each activity on a process chart. Having done this, and having put realistic deadline dates to each activity, it would then be possible to project the completion date.

Backward scheduling calculates job and event schedules back from the due date to project the start date. This is commonly used when the due date is critical, such as when a spray treatment has to be completed by a certain date to comply with harvest interval requirements. In this case, the completion dates for the various actions required for the sprays to have been applied by the final date will be scheduled accordingly.

Control Over Schedules

A schedule is a living document that belongs to all who participate in its compilation and its implementation. This means that it should be displayed in a prominent place, feature as an agenda point at operational meetings, and be referred to constantly.

On a regular basis the schedule must be reviewed and evaluated and if necessary adjusted to take account of changing circumstances. The various scheduling techniques provide for this process of review and adaptation.

Optimising Production Schedules – Identifying Production Pitfalls and Bottlenecks

Scheduling puts the agreed plan to a time frame. It is usually the step that follows planning and indicates the desired completion date, or deadline, for each activity within the overall plan. In practice, planning and scheduling are often done at the same time, when the activities required for the execution of a plan is identified and at the same time set to completion dates.

Various scheduling techniques can be used to facilitate the scheduling process. These include flow charts, milestone charts, critical pathway diagrams and Gantt charts. Of these, Gantt charts are the most useful for planning and scheduling citrus production projects, programs and activities.

A very important benefit of following a formal planning and scheduling process is that the documentation stipulating the actions and deadline dates serves as a means of ensuring that all participants have a single set of basic reference documentation. This facilitates communication and ensures that all role players are literally working off the same plan.

Left unattended, the growth and fruiting patterns of a citrus tree will be determined by its hereditary characteristics and how the natural environment in which it is being grown, act on these to trigger various responses. Environmental factors such as temperature, humidity, sunlight, day-length, and available soil moisture influence the rate and nature of various metabolic reactions in the plant tissue.

This, in turn, determines the nature and concentration of plant growth regulators located in various parts of the plant. These regulators switch reactions at the cellular level on and off, which manifest in the timing and nature of flowering, fruit set, fruit growth, fruit colour development, fruit drop, leaf drop, vegetative growth flushes and other responses.

The citrus production manager must understand that tree response to environmental conditions is complex and often unpredictable. He or she must, therefore, use

whatever tools are available to assess and measure the production status of trees at various critical times so that he or she can apply appropriate treatments timeously.

One of the primary goals of the citrus production manager is to produce high yields of marketable fruit. It is also important that he or she is able to predict the size of the crop, the likely fruit size range and the maturity time of the fruit long before the fruit is harvested. This is required for effective planning of harvesting, packing, transportation and marketing operations.

These crop predictions, or estimates, are made at various times, and the earlier they are made, the less accurate they are likely to be. For this reason, certain techniques are employed to improve the accuracy of early predictions.

Another reason why early crop predictions are important is to enable the production manager to plan and implement timeous actions, such as production treatments, that will result in the crop most closely meeting market specifications and requirements.

Production optimisation techniques, therefore, refer to the methods used to:

- Make early predictions relating to the crop.
- Manipulate the tree, its crop and / or the environment in such a way that the resultant crop is best able to meet the requirements of the market in an economic and sustainable manner.

At all times, it must be remembered that the purpose of optimising production is to meet the overarching goals and objectives of the enterprise, namely to maximise profits in a socially and environmentally responsible and sustainable manner.

Recording and Measuring Inputs

Decisions on the nature and timing of citrus production treatments, or interventions, are based on information. Inaccurate or incomplete information can easily lead to poor decisions that can waste money and have serious short- and long-term consequences for the crop and environment.

The quality of the information is determined by the data gathered and the manner in which data is processed, presented and used.

As a first step, it is, therefore, important to decide what data is important to collect and where and how it should be collected and processed to turn the data into useful information. The following are examples of the kind of parameters for which appropriate data is required as a basis for making critical citrus production management decisions:

- Expected blossom time
- Expected fruit set time
- Growth flush status
- Daily temperature, humidity, evaporation and rainfall measurements
- Orchard counts for specific pests and diseases
- Fungal spore counts
- Fruit growth-rate measurements
- Tree yield measurements
- Soil water status measurements
- Soil and leaf analysis results

For each of these parameters, a process for measuring and recording the most relevant data has to be developed and implemented. An example of a data record sheet for blossom stage and timing is given below.

example

Records

Record of Blossom Development Stage (% in each stage)					
Cultivar:	Valencia	**Orchard No.:**	10	**Date:**	
Data Tree No.	**Green Button**	**White Button**	**Balloon**	**Full Bloom**	**Petal Drop**
1	5	10	30	30	25
2	0	5	25	40	30
3	10	10	40	20	20
4	0	20	40	35	5
5	5	20	20	30	25
Average	**4**	**13**	**31**	**31**	**21**
Previous Years Averages					
2004	13	25	30	14	15
2003	0	20	35	25	20
2002	0	10	15	20	35
2001	20	35	40	5	0

The specific data provided by this record sheet is useful for estimating the ultimate fruit maturity date, as well as deciding the nature and timing of subsequent production actions, such as pest and disease control treatments. It also allows comparisons to be made with the situation at about the same date in past years. Note however that a data sheet of this kind is indicative only of the relative stage of maturity of the crop at a particular time. Such data is usually not suited for statistical analyses.

It is also necessary to keep track of the inputs made to the production process, and the input costs, during the course of the production cycle. The production planning and scheduling processes referred to in the previous chapters have shown how an action plan is developed for implementation. Once the plan is put into operation, it is necessary to track progress against the plan. The Gantt chart makes provision for this.

Measuring Production Output Data

If records are maintained properly and as a result of this accurate, useful information flows from the various operations during the production period, there should not be any major surprises for the production manager at the time of harvesting and packing the crop.

In practice, however, things do not always work out like this. Events in the period close to harvest, such as prolonged rainfall or drought, unusually high or low temperatures, labour disputes, or machinery failure, can have a sudden and disproportionate effect on the performance of a citrus production unit against expectations.

It is, therefore, important to track and measure final production performance (output) against targets set and to use this information to plan in future. This requires that appropriate output data is generated. For a citrus production unit, output refers to the quantity and quality of fruit produced which is suitable for the various market segments for which it was intended.

The following are examples of the output parameters for which appropriate data would be required for any single season:

- Yield and fruit size distribution by variety, rootstock, orchard and hectare.
- The percentage of fruit delivered to the various market segments (for example, export, local, fresh, processing).
- Cull factor analysis, being the proportion of fruit lost as a result of various pest, disease and environmental factors.
- Maturity indexing data, indicating the fruit maturity patterns culminating in when the fruit first reached harvest maturity.
- Actual versus budgeted income.

Such data has to be captured, processed and summarised in a user-friendly format to enable actual performance to be compared against predictions. The information arising from this would also be used to build historical records for tracking trends in annual performance.

Statistical Analysis

Statistical analysis is used to evaluate the validity or significance of the results from data collected. When we find differences between expected and actual results, it may not be possible to determine whether the difference is due to any identifiable factor, or whether it is simply due to chance variation.

It is commonly used to determine the validity of research results where different treatments are being compared. Such techniques are also sometimes used to assess the significance of observations made in the field.

For example, we may wish to know whether a particular chemical spray treatment should be used to increase the yield of Clementines. As a result, we decide to spray half of the orchard leaving the rest unsprayed. At harvest, we find that the average yield of all the sprayed trees is 5kg of fruit per tree more than that of unsprayed trees. Can we say that this difference is due to the spray treatment or due to sample variation, that is, due to chance? Statistical analysis provides the tools for being able to make valid conclusions in such comparisons and in much more complicated situations.

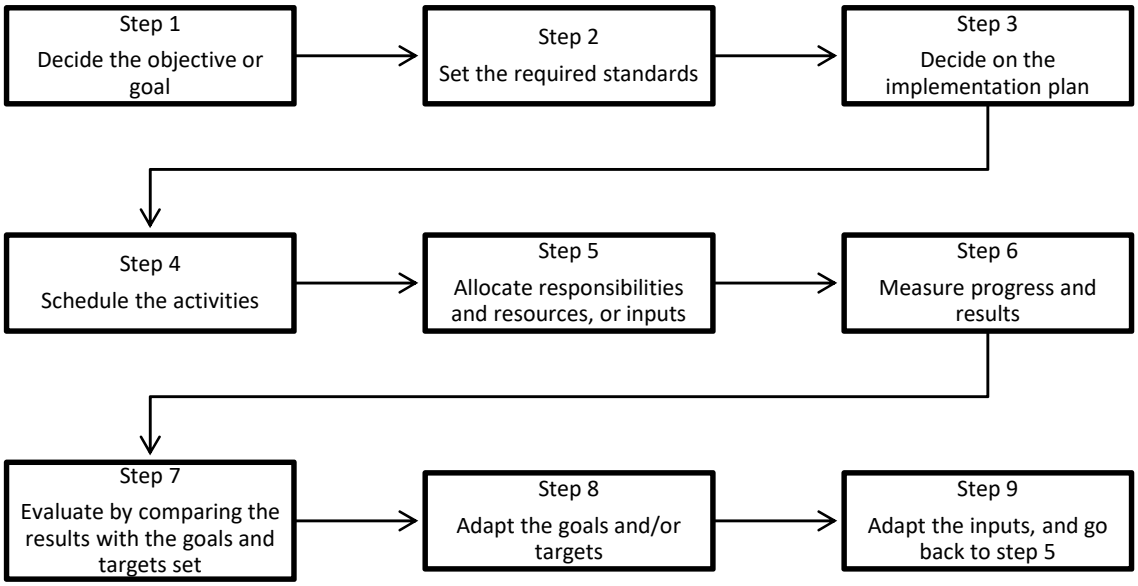
Statistical analysis is also most useful for determining the extent to which two variables are proportional or linearly related to each other. For example, to determine the relation between the seed content and the roughness (texture) of the fruit rind, data would be generated by taking a sample of fruit and recording rind texture ratings and the seed number for each fruit. The data would be statistically analysed to see if there is a correlation, or linear relationship, between rind texture and seed content. If the result showed a high correlation, we could conclude that if we wanted to know the seed content of a fruit of that particular cultivar we could do so by observing the rind texture without having to cut open the fruit.

There are many instances where statistical analysis is a valuable way of determining whether differences are real or perceived. Where costly decisions have to be made on a future tree or fruit treatment options, statistical analysis is especially handy.

Adapting Inputs to Achieve Required Output

Maintaining flexibility in the management of any project, programme or system is very important. Circumstances, especially in fruit production systems, change continuously. These changes are often related to climate or market demand factors, over which the producer has no control. The production manager, therefore, has to ensure that there is a continuous measurement and evaluation of production and market circumstances, thereby placing him or herself in a position to adjust inputs accordingly.

Earlier we have seen that the framework for managing a citrus production project or programme comprises a sequence of steps. These can be summarised as a follows:



This sequence, and step 9 in particular shows that the allocation of resources, or the application of inputs, is a dynamic process driven by changing circumstances and outcomes as the programme progresses.

practical

Complete the following formative assessment:

F263434.2 – Team Work Sample Framework Presentation

Chapter 3
Resource Management

The Concept of Resource Management in Agribusiness

In previous chapters, we defined planning, identified some of the different levels of planning, and considered the factors influencing planning. We also defined resources and made the distinction between fixed, or natural, resources and mobile resources.

We have also seen that resources and inputs are similar, though resources are generally viewed as start-up requirements, while inputs usually refer to ongoing operational requirements.

In this section, we bring together these concepts to assess the status and availability of resources for a citrus production operation as the first step towards using resources in a responsible and sustainable manner.

Maintenance Plans and Systems to Ensure Sustainability

Resource Planning

Assume that the decision has been made to produce citrus for the first time, or to expand existing plantings or production. The first question should be: Is there a market opportunity for the range of citrus cultivars that I can produce here? Let us assume that the results of the market study are positive.

The second question is: Do I have the necessary resources to produce what the market wants?

Finding the answer to this question is the essence of resource planning, along with determining how the available resources can be used to ensure that quality production is sustained for as long as possible without depleting resources.

To determine whether the required resources are available, an inventory needs to be made of the quantity and quality of the resources and inputs that are available, compared to what is required for the production of specific cultivars. One can then determine whether it makes financial and practical sense to undertake the enterprise.

An inventory of this kind would include the following:

- Climatic features
- Land
- Soil
- Water
- Plant material
- Capital

- Labour
- Agrochemicals
- Machinery and equipment

Climatic Features

Climate is viewed as a resource in the sense that temperature, humidity and sunshine are vital contributors to the productivity of the trees and the marketability of the product. They are factors characteristic of a region or area that determine the suitability of that location for the purpose of high-quality citrus production.

If grown in an unsuitable or marginal climate, citrus trees require more manipulation to deliver a desirable yield and fruit quality. The greater the need to manipulate or intervene, the more the long-term sustainability of production in that location is threatened, the greater the impact on the environment, and the higher the production costs.

The questions that need to be answered are the following:

- What are the long-term average monthly maximum and minimum temperatures of the area?
- When converted into heat units, how do these compare with other areas known to be suitable for the selected range of cultivars?
- What are the dominant prevailing wind directions and strengths? Are windbreaks necessary and, if so, can they be accommodated?
- Will the climatic conditions, such as high temperatures and humidity, increase pest and disease pressure?
- Or conversely, what is the range of cultivars that could be produced given the climatic profile of the area?

In South Africa, commercial citrus production is confined to areas with mild and almost frost-free winters and where temperatures seldom drop below -2°C.

Factors limiting citrus production in some areas are:

- High spring and summer temperatures
- Low relative humidity
- Water stress during critical growth periods due to poor availability
- Hail
- Wind, which causes external blemishing

Of these, temperature is the most important factor that accounts for observed differences in vegetative and fruiting characteristics. It is, however, difficult to separate the influence of temperature from that of other factors.

Land

Apart from the availability and cost of land, the following questions need to be answered regarding the qualities of the land:

- Is it sufficient in size and topography to support the required planting?

- Can the majority of tree rows be planted in the ideal north-south orientation?
- Does the orientation of the land create microclimates to favour the production of certain cultivars or cultivar selections?
- Is the land located near to suitable infrastructure, especially transport?

Soil

Generally speaking, citrus requires well-drained, deep, sandy loam soils with clay content of below 30% and a neutral pH. The chemical and physical properties of the soil should be analysed before a decision is taken to establish citrus.

By deep ripping and ridging, some marginal soils can be made more suitable. Although these actions will increase costs, they can also be of use in crop manipulation, such as for heating soil in cold climates.

Water

The peak water requirement of the envisaged planting must be calculated and compared with the available water resource. As a rule of thumb, provision should be made for between 50 litres per adult tree per day for high-density plantings (>1000 trees / hectare) and 100 litres per adult tree per day for widely spaced trees (<600 trees / hectare). Allowances should be made for evaporation if holding dams are to be used.

The water source should also be analysed to determine its chemical quality and the presence of any harmful fungal diseases.

Nursery Trees

Trees can be purchased from any number of citrus nurseries. Before ordering, it is important to ensure that the nursery is accredited by the Citrus Improvement Programme (CIP) and to ensure that the nursery will supply trees that are true to type and of a high quality.

The physical requirements for certified citrus nursery trees are as follows:

- All trees must be healthy in all respects and must not have any serious damage.
- The trees must be free of pests.
- The stems of all trees must be straight.
- The bud union must be at least 200 mm above soil level.
- The trees must have a healthy, well-developed root system that is free of harmful pathogens and nematodes.
- Trees must comply with the basic tree size standards as specified in the CIP Scheme.

Capital

The cost of capital can be viewed as the annual interest payment on the sum required. A business plan is required, which sets out the marketing plan, the production objectives and the capital required to fund the establishment and

operation of the farming unit. Here, the cash flow projection is critical and should be based on conservative prices and constantly rising costs.

Capital can be borrowed from a number of financial institutions. The interest rates and repayment terms that are negotiated with the financial institution have a great impact on the viability and sustainability of the farming enterprise.

Labour

There must be a source of permanent and temporary labour available in the area. Experienced and skilled permanent workers bring a competitive advantage to a farming enterprise. Many farmers also continue to develop the skills of their permanent workforce through ongoing capacity building programs.

The industry average for fieldworkers is said to be one worker for every five hectares. In addition, lower, middle and upper management personnel are also employed, with the management structure and number of positions depending on the size of the farming enterprise, and the farming practices.

Harvesting and packing are highly labour intensive activities, during which temporary workers are employed. The number of temporary workers required depends on the total crop yield and the time available for picking and packing.

Agrochemicals

Agrochemicals includes ameliorates for soil preparation, fertilisers and crop protection chemicals, herbicides, and postharvest chemicals. The types and quantities of agrochemicals that are required depend on the size of the production operation and the farming practices that are employed.

Agrochemicals are purchased from reputable firms or from farmer cooperatives. Thought must be given to the availability of agrochemical sources in the area where the farm is to be established. If the farm is not in or close to an established farming community, the cost of transporting inputs may increase production costs considerably. The farm may also need to keep considerable stock on the farm because of inaccessibility, resulting in higher capital requirements.

Machinery and Equipment

Machinery and equipment that are used on citrus farms include:

- Tractors
- Spray machines also referred to as mist-blowers
- Herbicide carts
- Flatbed and picking trailers
- Grass slashers
- Water carts
- Harvesting equipment, including ladders, clippers and picking bags
- Planting equipment, including measuring equipment and spades
- Soil preparation equipment, including rippers
- Maintenance tools and equipment

The types and quantities of equipment that are required depend on the size of the farming operation and the farming practices that are employed.

Machinery, equipment and tools are purchased from reputable suppliers or from a farmer cooperative. It is important to purchase machinery and equipment, especially large and expensive machinery such as tractors and spray machines, from dependable dealers in the area where the farm is located, because after-sale service plays an important role in how effectively the machinery can be used.

Sustainable Resources Use

The sustainable use of resources means the use of the resources in such a way as not to damage, harm or deplete them while using them to maintain production of the required yield and quality. The important principle underpinning this is minimum intervention.

If citrus is established in an unsuitable environment or with soils, water or nursery trees of inferior quality, there will be an ongoing need for interventions of various kinds. Such interventions are not only costly, and therefore threatening to the profitability of the enterprise, but may require the repeated use of chemical treatments that can start a spiralling cycle of damage to the environment.

example

Suboptimal resources

- If the climatic conditions in the area do not favour the production of good yields of high-quality fruit of the chosen cultivars, the production manager will face an ongoing battle to attain the required standards by crop manipulation. Such manipulation may take the form of physical treatments such as trunk girdling or pruning, or chemical treatments such as hormone or supplementary nutritional sprays.
- If the pH of the soil is too high or too low, corrective action, in the form of applications of certain chemical formulations, has to be taken on a regular basis.
- If the nursery trees are of inferior horticultural quality, the production of high yields may require ongoing physical and chemical manipulation, or may not even be achievable whatever interventions are made.
- If the trees become infected with fungal, bacterial or viral diseases, there may be a requirement for regular chemical or physical disease control actions. Such diseases may have their origin in the nursery trees, be endemic to the production area, or be induced by poor management practices.

Water is one of the scarcest resources and the use of water must be managed and controlled very carefully to ensure its sustainability. In order to preserve the supply of water, the irrigation system should be effective and efficient. In water-scarce countries, such as Israel, important pioneering work was done in the design of micro-sprinkler and drip irrigation systems to optimise water use efficiency. Such systems form the basis of sustainable water usage in citrus.

Water quality must also be maintained to ensure that the available water remains useful. Every farmer has the responsibility to ensure that the water that leaves the farm

is of the same quality as the water that is received on the farm. Regular sampling and analysis is required to ensure that the water quality remains acceptable.

Agrochemicals pose a direct threat to the environment. If certain broad-spectrum pest control treatments are used, they may damage the populations of beneficial insects. Pesticides must be chosen carefully on the basis of their specific impact on the targeted pest and their minimal disruption to beneficial insect populations.

Evaluating Existing Technology

Successful citrus production operations employ systems whereby the condition, efficiency and cost- effectiveness of existing machinery, equipment, information technology, production and harvesting technology, and communications and financial technology are regularly monitored and evaluated. Such technologies include motor vehicles, irrigation systems and equipment, agrochemical spray machinery, tree pruning equipment, computer equipment and software packages.

Analysing the Influence of Technological Advances

By comparing the outcome of the above-mentioned evaluations with the features and price tags of new machinery, equipment or technologies, ongoing decisions can be made on the merits of retaining existing equipment and machinery or replacing these with newer, improved versions. Such decisions depend on current production efficiencies, the level of capital and other resource reserves, new prospects offered by predicted market demand, and the skills available on site to improvise and improve existing technologies.

Information to be provided on a typical technology audit sheet includes the following:

- Description of the item or the relevant machinery, equipment or technology, its purchase details, including supplier, date and cost, and its present day value.
- Its functional specifications, and other details pertaining to its use, capacity and capabilities.
- Details of its servicing, repair and maintenance history.
- A cost / benefit analysis where the value of the item over the period it has been used is related to its cost and compared with the alternative option.

According to Mind Tools, (http://www.mindtools.com/pages/article/newTED), a cost / benefit analysis is a powerful, widely used and relatively easy tool for deciding whether to make a change. The tool is used by firstly working out how much the change will cost to make, and then calculating the benefit you will gain from it. Where costs are paid over time or benefits are received over time, the time it will take for the benefits to repay the costs is calculated.

A cost / benefit analysis can be carried out by using only financial costs and financial benefits. Intangible items may however also be included in the analysis, such as ease of use of the new item and its value to the morale of the staff involved in using it. These values are estimated and inevitably bring an element of subjectivity into the process.

The cost / benefit analysis forms the basis upon which comparisons are made and decisions taken on the merits of retaining existing machinery or technologies and purchasing new ones.

example

Cost / benefit analysis

The production manager is deciding whether to implement a new computer-based pest and disease control system. He only has one computer at his disposal and his employees are not computer literate. But he is aware that by creating a computerised database and using this for future decision-making, his crop will achieve a higher export percentage.

His financial cost / benefit analysis could be along the lines of the one given below:

Costs	Benefits
New Computer Equipment: • 2 PCs with supporting software @ R8,000 each • 2 Printers @ R700 each • Cabling and installation @ R2,000 **Training Costs:** • Computer introduction, 2 people @ R200 each • Pest and disease introduction, 2 people @ R400 each **Other Costs:** Lost time: 5 man days @ R300/day **Total Costs: R22,100**	• Time-saving in manually processing field inspection data: 4 people @ R400/day • Savings on purchasing pesticides in bulk: R10,000 • Improve export percentage by 3%: R30,000 **Total Benefit: R41,600 / year**
Cost Recovery Period: R22,100 / R41,600 = 0.53 years = approx. 6 months	

Although the estimates of the benefits are quite subjective, the production manager would be likely to introduce the new system, given the short cost recovery period.

Note that larger projects would be evaluated using formal finance or capital budgeting, which takes into account many of the complexities involved in financial decision-making.

Estimating and Extending the Lifespan of Machinery and Equipment

Decisions on whether and for how long to extend the lifespan of machinery and equipment, can best be made following proper analysis. Machinery and equipment can become redundant for three main reasons:

- Wear and tear rendering it ineffective
- Becoming technologically outdated
- Changes in usage requirements

Regardless of the reason for redundancy, an appropriate analysis needs to be done to evaluate the merits of replacement over maintenance, the cost of new technology over the loss of efficiency of existing machinery, and the possibilities for adapting present equipment to deal with new demands.

The analysis tools used will vary depending on specific circumstances but a cost / benefit analysis remains the most useful method for evaluating the merits for trying to extend the lifespan of equipment and deciding on when it should be replaced.

Designing a Maintenance Plan for Machinery

Any effective citrus production operation requires a formal equipment and machinery maintenance capability. This starts with the establishment of a maintenance plan. In designing such a plan, the scope of actions and competencies need to be detailed.

Competence in performing operational maintenance of machinery requires evidence of the ability to select and match the correct tools and supplies to carry out scheduled servicing and minor repairs to a range of plant and equipment. It also requires the ability to apply operational safety procedures, access and interpret maintenance plans, apply basic diagnostic techniques, recognise and rectify minor mechanical faults, and keep maintenance records.

An overall machinery maintenance plan is required to cover the processes and procedures to be followed by the enterprise in respect of the full range of machinery and equipment. The maintenance plan, first of all, needs to state the objectives of the maintenance procedure, and secondly the functions.

A checklist of the essential functions of such a maintenance plan is:

- Management's responsibility
- Organisation
- Administration
- Maintenance scope
- Safety
- Maintenance assessment
- Budget
- Capitalisation
- Personnel

- Work rules
- Operations
- Maintenance responsibilities
- Work control
- Maintenance stores

Within the scope of this checklist, individual maintenance plans covering each type of specific equipment or machinery can be designed.

This would include details, such as maintenance schedules and the items to be covered at each maintenance service occasion such as lubrications, repairs and replacements.

Comparing Leasing with Purchasing and Replacement with Repair

The main advantage of leasing is that the initial cash outlay to gain the use of an asset is generally less than it is for purchasing. The main disadvantage of leasing is that the total cost of the asset over the lease period is considerably higher than what it would have been if the asset had been purchased outright.

How do you reconcile these two factors? One way is to do a mathematical analysis of net cash flows that would result from leasing and from purchasing.

A cash flow analysis provides an estimate of how much cash one would need to set aside today to cover the after-tax costs of each acquisition alternative.

The analysis takes into account the "time value of money", which basically means that you do not need to have R50 today to pay a R50 expense one year from now because you can earn interest on your money. On the other hand, the purchase value can be expected to escalate at the rate of inflation.

To perform the analysis, you need to know or assume certain facts, including:

- Purchase and financing terms
- Leasing terms
- Income tax rates
- Asset's expected useful life to your business for depreciation purposes
- Asset's estimated value, if any, at the end of its useful life to your business
- Cost of capital
- Any other costs that would be incurred if the asset was leased and not purchased, or vice versa, for example, expected maintenance costs if the lessor was assuming responsibility for those costs.

Very much of the same argument applies to repair versus replace. Each case has to be judged on merit after the necessary analysis has been carried out.

Here too, the analysis would require inputs including the cost and terms of purchase, the maintenance record and cost, the expected future life of the equipment, changing usage requirements, cash flow considerations, and technological advances.

Record-keeping Systems to Manage and Control Business Resources

The Production Plan

The production plan ranks alongside the marketing plan and financial plan as major contributors to the overall strategic plan of the enterprise. These plans form the basis of the business plan that demonstrates how the different facets of the enterprise are linked in achieving targeted revenue and profits and sustainable cash flow.

The production plan comprises a number of component sub-plans, each with their own objectives and timeframes. These include, for example, individual orchard yield plans or projections, pest and disease control plans, the fertiliser and irrigation application plan and so on. In this section, we focus on the production plan itself, which represents the combined outcome of all the sub-plans.

At the heart of the production plan for citrus is the production or yield model. This takes into account cultivar, rootstock, tree spacing, climate, soils, irrigation, and pest and disease factors. The yield model, in fact, takes into account the role of all resources and inputs, together with observations that are made in the orchard, to project the year-on-year yield for the lifespan of the specific planting. The sum of the yield models for each cultivar gives the production model for the entire farm or enterprise.

example

Yield model

An entrepreneur decides to establish citrus for fresh fruit export on a 100ha farm located in the Mpumalanga Lowveld. Having conducted an evaluation of the market potential for cultivars known to be suited to the region, he takes stock of his resources.

He evaluates the location of the farm and its topography in terms of its suitability for citrus. He conducts a soil survey and determines the availability of water. He investigates the availability of labour and identifies a source of certified nursery trees. He conducts a risk analysis of the pests and diseases in the region.

He determines his labour requirements and ensures that there is enough skilled labour available in the area. He determines his agrochemical and machinery and equipment requirements and identifies reputable suppliers in the area.

He then uses all this information, adds factors such as rootstock, planting distances, and determines a production or yield model for each citrus variety he intends planting.

For the sake of simplicity, let us say he decided to plant only two varieties, grapefruit and Valencia oranges, of which he intends planting 50ha each.

The production or yield model for these inputs could look something like the table below for the first sixteen years of the respective plantings' life spans, with the total yield calculated by multiplying the yield per hectare with the number of hectares.

example

Years After Planting	Yield / Hectare (Metric Tonnes)		Total Yield (Metric Tonnes)		
	Grapefruit	**Oranges**	**Grapefruit** (50ha)	**Oranges** (50ha)	**Total**
1	0	0	0	0	**0**
2	12	0	600	0	**600**
3	29	5	1,450	250	**1,700**
4	45	17	2,250	850	**3,100**
5	52	24	2,600	1,200	**3,800**
6	57	33	2,850	1,650	**4,500**
7	63	40	3,150	2,000	**5,150**
8	67	46	3,350	2,300	**5,650**
9	67	51	3,350	2,550	**5,900**
10	67	54	3,350	2,700	**6,050**
11	67	58	3,350	2,900	**6,250**
12	67	59	3,350	2,950	**6,300**
13	60	60	3,000	3,000	**6,000**
14	55	60	2,750	3,000	**5,750**
15	53	60	2,650	3,000	**5,650**
16	47	60	2,350	3,000	**5,350**

A figure for the estimated percentage of exportable fruit can be factored into the yield model to calculate the amount of fruit available for export each year. Fruit size ranges could similarly be introduced into the model. A price projection can now be done based on historical data. With projected export percentages for class 1 and class 2 fruit, and projected size ranges, prices per size range and per class can be projected and the total projected income can be calculated.

This information would then be used as the basis for determining the extent to which estimated production will meet projected demand. This could, in turn, be used for planning packhouse capacity and as the basis for compiling financial and business plans for the enterprise.

The production practices that are required to achieve the projected production can now be formulated. It may, for instance, be found that in order to produce fruit in the size range that is most profitable in the market that is targeted by the producer, specific irrigation and fertilisation practices are required. Once the production practices have been determined, the labour requirements to implement the planned practices can be calculated.

The production plan for the enterprise is now in place and can be implemented, managed and monitored.

The production plan can now also be used as a basis for developing a business plan for the enterprise. The cost of the planned production practices and projected labour requirements can be calculated and the capital requirements, profitability and cash flow of the enterprise can be calculated.

Legal Compliance of Record-keeping

The employment of resources to support the production plan has to be compliant with legislative requirements. These legal requirements that are promulgated as acts of parliament effectively place boundaries on the various production and marketing activities and how they are conducted.

The citrus production manager should be aware of the key requirements of these and other relevant pieces of legislation when planning his citrus production enterprise. Compliance with the requirements may involve costs that have to be factored into the plan.

The following are examples of some of the activities and the related Acts:

- Conservation of the environment – Conservation of Agricultural Resources Act of 1983 and National Environmental Management Act of 1998, Plant Improvement Act.
- The minimum citrus fruit quality standards for local and export products – Agricultural Products Standards Act of 1990
- Health and safety and good agricultural practices – Health Act of 1977, Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act of 1947, Agricultural Pests Act 1983, Occupational Health and Safety Act
- Marketing of citrus – Marketing of Agricultural Products Act (Amended) of 2001, Agricultural Produce Agents Act
- Citrus research – Agricultural Research Amendment Act of 2001, National Advisory Council on Innovation Act of 1997
- Citrus technical advisory activities – Natural Scientific Professions Act 0f 1993
- Equity and fair labour practices – Employment Equity Act of 1998, Basic Conditions of Employment Act, The Land Reform Act (Labour Tenants) of 1996

practical

Complete the following formative assessment:

F263434.3– Team Brainstorming Session and Mind Map

Chapter 4
Quality Management

The Fundamentals of Quality Management in Agribusiness

The term quality has been defined in many different ways, from simply "a measure of excellence" to the more analytical definition of "a reduction of variation around the mean" (www.qualitydigest.com/html/qualitydef.html).

definition

Quality

The definition could also be expanded to the following: "Quality is the outcome of the sum of all of the features and characteristics of a programme, process, or service that impact their ability to meet or surpass the needs and requirements of a customer".

Quality defines desirable characteristics of a product, a process, or a service. For the purposes of this learner guide, the term quality applies to that of the product, or fruit.

Quality Principles in Response to Market Requirements

In the case of fresh citrus, quality, whether it is good or bad, is evident in the appearance and / or taste of the fruit, and by its apparent storability, freshness or condition. It, therefore, has to do with the perception and expectation of the customer, and like beauty is something that is in the eye of the beholder.

Quality is, therefore, a relative concept, and a moving target, depending on various factors that may happen to influence customers' expectations at any particular time. Issues such as the quality of competitors' products, price, and the demand-supply balance all influence the customers' perception of the quality of specific fruit at any given time.

Over a longer period, a particular source of fruit may develop a good quality reputation because it consistently meets or exceeds customer expectations. Consumers may come to associate this with a particular brand name and seek this in their purchases.

In the fresh fruit business, the term quality also has a wider meaning. It also refers to the extent to which the product is safe to eat. Factors related to food safety are not usually apparent to the eye. A situation can, therefore, exist where a product looks attractive, tastes good but is unsafe to eat because of high levels of chemical residues. Such a product could hardly be considered to be of high quality. Any reference to fruit quality in the citrus industry, therefore, should also incorporate the concept of food safety.

In the past, retailers used the quality of their fresh produce to differentiate themselves from their competition. Today, with the strong purchasing power of the supermarket chains, it is

said that fruit quality is a given. This simply means that in order to participate in this market at all, the supplier, or producer, must be able to virtually guarantee a certain minimum quality standard regardless of whatever problems or costs he may encounter in achieving this.

Product Quality Measurement Tools

Setting Quality Standards

Because quality is relative and subjective, standards have to be set that are accepted and applied throughout the industry. Standards protect the grower, the industry and the consumer.

Food safety standards in South Africa are prescribed by the Department of Agriculture, Forestry and Fisheries through the Agricultural Product Standards Act (APS), which in turn underpins a number of regulations, and ultimately standards and requirements applicable to all stages of the supply chain.

These standards comprise a detailed list of more than thirty different minimum requirements applicable to the external appearance of the fruit and an equally detailed set of standards applicable to internal quality factors. Included here are phytosanitary standards that apply to certain pests and diseases whose symptoms indicate their presence in the orchard and which importing countries have banned or placed certain restrictions on. The standards also include maximum residue levels for every plant protection product that is used in South Africa. Maximum residue levels, MRLs, prescribe the amount of every product that is still allowed to be on the fruit when it is exported.

In addition to the general standards prescribed by the APS, there are also commercial standards organisations to which farmers can subscribe on a voluntary basis. The most well-known of these is GlobalGAP.

In the mid-1990s, the Euro Retailer Group (EUREP), representing the leading European food retailers, agreed to accept and promote a set of good agricultural practices (GAP). This was in response to increasing consumer interest in the impact of agriculture on food safety and the environment. GlobalGAP was consequently established as a private non-profit organisation with its headquarters in Germany. In terms of GlobalGAP requirements, suppliers, or producers, are required to demonstrate their commitment to:

- Maintaining confidence in food quality and safety
- Minimising detrimental impact on the environment, whilst conserving nature and wildlife
- Reducing the use of agrochemicals through adoption of Integrated Production Systems
- Improving efficiency of use of natural resources such as soil, water air and energy
- Ensuring a responsible attitude to worker health and safety, welfare and training

The GlobalGAP standard comprises three categories of control points that require different levels of compliance. These are the major musts, (100% compliance required), minor musts (95% compliance) and shoulds (recommendation level). The major and minor musts constitute most of the food safety related aspects at the

production sites with a strong emphasis on the regulation of GAP in the application of agricultural chemicals.

The higher paying markets are usually those requiring proof of compliance to their specific quality standards. The producer must analyse the costs involved in meeting the quality standards of the different market segments available to him. Such cost-benefit analyses will assist the producer to decide on the overall strategy of his enterprise.

Quality Management

To ensure the quality of a product, and to ensure compliance with general and specific standards, quality management must be exercised on every farm. Quality management does not stand apart from other production processes and is not a reactive process, but should rather form an integral part of every production process.

Quality management is about two key aspects, being quality assurance and quality control. These are discussed further below.

Quality Assurance

Quality assurance is concerned with the practices, processes and procedures used to assure the final quality of the product. The quality assurance procedures and practices that are followed for example while the fruit is developing on the tree are critical in determining the final quality of the product. This is because the internal quality of the fruit is fixed by the time the fruit is ready for harvest. There will be no perceptible change in the sugar or acid content of the fruit after harvest. The rind of the fruit will also by then have developed certain characteristics that will make it either more or less prone to physiological disorders or waste.

Climate, irrigation, and nutrition are the overriding factors determining internal quality and in predisposing fruit to postharvest quality and condition problems. Since little can be done to modify the climate, orchard practices should be directed at reducing the possible negative effects of unfavourable climatic conditions in a sustainable manner.

The implementation of good agricultural practices (GAP) in the pre-harvest environment and good manufacturing practices (GMP) in the packhouse or processing facility are an integral part of quality assurance.

It is also important to have systems in place for tracking the quality of the fruit as it develops on the tree. In the case of quality defects to the rind caused by insect or disease damage, this can be achieved by adherence to pest and disease control programs based on the monitoring of pest and disease levels in the orchard. In the case of internal fruit quality characteristics, it can be achieved by monitoring the timing and evenness of flowering, measuring fruit size increases at regular intervals, monitoring irrigation and the moisture status of the soil, and implementing fruit maturity indexing procedures.

Quality Control

Once fruit has been harvested and packed it has to be inspected, or subjected to quality control, to determine its compliance with pre-determined minimum standards. Since quality cannot be "inspected into a product," it must be remembered that the process of quality inspection cannot improve a product, nor

guarantee that, in the case of a perishable product such as citrus, it will not deteriorate subsequent to the inspection.

On a national basis, The Perishable Products Export Control Board (PPECB) is an assignee of the Department of Agriculture, Forestry and Fisheries and is mainly responsible for ensuring that perishable products meet the minimum standards laid down by local authorities or those of importing countries. PPECB are therefore an agency responsible for quality control.

Quality control is however not only concerned with "end point" inspection. Quality can also be inspected at various other points in the production and trade chain. For example, maturity indexing is a case of on-farm quality control, which is aimed at measuring the response of trees and / or fruit to the various inputs made.

Quality Management Systems

It is clear from the above that formal quality assurance and control systems and procedures are required for the successful production and packing of citrus. The more specialised the market requirements are, the more effective the quality assurance and control procedures need to be. The Hazard Analysis Critical Control Point (HACCP) system is a good example of a formalised quality assurance system.

HACCP is a systematic approach to the identification, evaluation and control of food quality hazards in the process-flow of a product. The HACCP system is designed for the packhouse environment but can be applied to any other segment of the trade chain, such as production, harvesting, and distribution to assist with quality control. The seven principles of HACCP are the following:

- Hazard analysis
- Identification of critical control points
- Establishing critical limits
- Monitoring critical control points
- Establishing procedures for corrective action
- Record-keeping
- Verification

practical

Complete the following formative assessment:

F263434.4 – Research Summary

Section 1: Self-Assessment and Progress Check

Design a production / operations layout for a new venture.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain the concept of productivity in a competitive citrus production unit.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Describe the production cycle of citrus.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Give examples of the operational elements involved in running a citrus production unit.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Use a production plan to schedule and optimise workflow.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Analyse market potential and limitation to plan for the capacity needed to operate a citrus production unit profitably. (Including limitations such as: expertise, capital (finance and infrastructure), equipment, technology).	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Apply effective production / operations scheduling.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain the need for effective production scheduling within an agribusiness	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Design an effective production system for specific areas of an agribusiness. (Including areas of scheduling such as: workforce, ordering of stock and raw materials, deliveries and maintenance activity).	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Identify potential bottlenecks that may affect production flow and analyse them in order to take corrective action.	❒ I have the answer and am	❒ I am still not sure of this and am not

	ready to start with assessment	ready to start assessment
Apply resource management within a new venture.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain the concept of resource management in an agribusiness. (Including resource management elements such as stock, raw materials, machines, equipment, buildings, capital and people).	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Develop a record-keeping system to effectively manage and control business resources.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Design and develop a maintenance system to ensure sustainability of the business to perform competitively.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Apply quality management within a new venture.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain the fundamentals of quality management in terms of agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Lay down quality principles in response to market requirements.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Design measurement tools to measure the quality of the product against a specific set of standards.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment

Section 2: Strategic Planning for Business Improvement

Learning Goals and Pathways

In order for a business to succeed and grow it needs to constantly be renewed and improved. In order to do that, one needs strategic planning and management systems. This section will help you to explore and understand the concepts and functions associated with strategic planning and strategic management functions in order to improve your business.

This section is presented in chapters 5 to 9 of the guide.

The learning goals for this module include:

1. Describe the concept of strategic planning in managing business performance.
2. Explain the role of the various functional strategies in business performance.
3. Apply business performance supervision and monitoring.
4. Monitor, measure and report on business performance.
5. Identify and rectify performance problems occurring in business.

Chapter 5
Strategic Planning to Manage Business Performance

The Concept of Strategic Planning

Strategic planning is a management tool that is used to help an organisation do a better job: to focus energy, instil a sense of common purpose and adjust the organisation's direction in response to a changing environment. It is not a substitute for judgment by leadership, rather it is a disciplined effort to produce fundamental decisions and actions that shape and guide what an organisation is, what it does, and why it does it, with a focus on the future.

The process is strategic because it involves preparing the best way to respond to the circumstances of the organisation's environment. Being strategic means being clear about the company's objectives, being aware of the organisation's resources, and incorporating both into being responsive to a dynamic environment.

The development of a strategic production plan requires the setting of long-term goals (what), an assessment of the current situation and devising and planning a means by which (how) it will be possible to move from the present to meet the set goals.

The citrus production manager should be aware of the key requirements of these and other relevant legislation when developing the citrus production plan. Compliance with the requirements may involve costs that have to be factored into the plan.

The plan ultimately comprises a set of decisions about what to do, why to do it, and how to do it. Because it is impossible to do everything that needs to be done in this world, strategic planning implies that some organisational decisions and actions are more important than others and that much of the strategy lies in making the tough decisions about what is most important to achieving organisational success.

Strategic planning can be complex, challenging, and even messy, but it is always defined by the basic ideas outlined above and you can always return to these basics for insight into your own strategic planning process.

Strategic planning differs from long-range planning in their emphasis on the "assumed" environment. Long-range planning is generally considered to mean the development of a plan for accomplishing a goal or set of goals over a period of several years, with the assumption that current knowledge about future conditions is sufficiently reliable to ensure the plan's reliability over the duration of its implementation. In the late fifties and early sixties, for example, the US economy was relatively stable and somewhat predictable, and long-term planning was, therefore, both fashionable and useful.

On the other hand, strategic planning assumes that an organisation must be responsive to a dynamic, changing environment, and not the more stable environment assumed for long-range planning. Strategic planning, then, stresses the importance of making decisions that will ensure the organisation's ability to successfully respond to changes in the environment.

Strategic management is the application of strategic thinking to the job of leading an organisation. Management need to be continually asking the question, "Are we doing the right thing?" It entails attention to the big picture, and the willingness to adapt to changing circumstances. It consists of the following three elements:

- Formulating the organisation's vision in light of changing external factors such as regulation, competition, technology, and customers.
- Developing a competitive strategy to achieve the vision.
- Creating an organisational structure that will deploy resources to successfully carry out its competitive strategy – structure follows strategy.

Strategic management is adaptive and keeps an organisation relevant. In these dynamic times, it is more likely to succeed than the traditional approach of: "If it ain't broke, don't fix it."

Finally, strategic planning, though described as disciplined, does not typically flow smoothly from one step to the next. It is a creative process, and the fresh insight arrived at today might very well alter the decision made yesterday. Inevitably the process moves forward and back several times before arriving at the final set of decisions.

Therefore, no one should be surprised if the process is more like a ride on a rollercoaster than a comfortable trip on a passenger train. But even rollercoaster cars arrive at their destination, as long as they stay on track.

The Benefits of Strategic Planning and Performance Monitoring

Developing an effective strategic plan is only "half the battle." Getting it implemented is the other, and generally the tougher, half. And an important part of strategy implementation is monitoring – taking a periodic look at "how it is going."

Monitoring the implementation of your strategic plan is important for a number of reasons. First, it helps to assure that your efforts conform to the plan. That you are actually performing the action steps you intended. That you are "on track."

Second, you have got to be sure the results you achieve align with your quantified objectives. That you are accomplishing what you intended to accomplish. Monitoring helps here too.

Monitoring allows for corrective action. For making the necessary changes along the way. To "fine tune", not only your strategies but your planning process as well.

Since monitoring is part of a control process, it encourages improved performance. Knowing they will be measured stimulates employees to do a better job.

Finally, and most importantly, monitoring provides the essential link between the written plan and the day-to-day operation of your business. It demonstrates to all that "you really are managing the business according to your plan". Monitoring the plan makes your entire planning effort a tangible reality rather than a once-a-year academic exercise.

Timing of a Strategic Plan and the Performance of the Business Unit

As critical as business planning is to the success of your company, all plans are useless unless followed by action. An additional side benefit of strategic planning is the natural action plan that stems from identifying your preferred strategy. While strategic planning involves your vision, mission and dreams, it also further defines the rudiments of your action plan to achieve the results you want. For example, if you adopt a

strategy of increasing business-to-business revenue, you have also identified a basic action plan.

Remember that your strategic plan should work within the timing cycles of your production plan and be sensitive to market forces. In other words, you cannot hold a strategic planning session, and decide to develop new orchards with new cultivars out of season, or embark on a cost saving plan that interferes with your fertilisation or IPM plans.

practical

Complete the following formative assessment:

F263456.1 – Team Framework Presentation

Chapter 6
Role of Functional Strategies in Business Performance

Defining Functional Strategies

definition

Functional strategy

Functional strategy is a selection of decision rules in each functional area. Thus, functional strategies in any organisation (for example, marketing strategy and financial strategy) are desired to be fixed in writing.

A functional strategy is one that dictates the task and activities of a certain business area. Owners and managers make up certain rules and guidelines for employees to follow. Each department operates by these guidelines, with all departments working together to achieve the overarching company goals. Common areas where a company may implement a functional strategy include the production, finance, or the research and development departments. An organisational strategy may also be functional.

Production department strategies often fall under the "make versus buy" analysis. Each product or product line is reviewed by owners and managers, who use specific rules to make this decision. The functional strategy helps dictate how to decide the best alternative for new or existing products. For example, the strategy may involve reviewing available materials, looking at the labour skill in the current market, and reviewing the costs for outsourcing the product for production purposes. The result leads to an informed decision on how a company will proceed with product production.

A company's finance department typically makes decisions on capital structure. The capital structure includes a mix of debt and equity funds to finance large business operations. A functional strategy provides guidance on how to review operational income and decide what portion should be reinvested into the company. From here, finance employees then look to different funding options to fund the shortfall in cash from operations. Selecting the lowest cost of capital from the mix of funding options is typically the goal of a functional strategy.

example

Example of a functional strategy related to marketing

As a commercial citrus grower, you may decide on and document a specific strategy related to the marketing of your produce.

- Grower A – The strategy may be to employ a marketing specialist and establish an own marketing department, who will focus on marketing to the domestic and international market.

example

- Grower B – The strategy may be to work in a cooperative structure to market only to the domestic market with a centralised marketing department under contract to the Cooperative.
- Grower C – The strategy may be to outsource all marketing functions to a marketing company / export agent, in order to focus solely on the international export market.

Strategic Planning to Determine Alternative Functional Structures in Agribusiness

It is important to define functional strategies clearly in order to ensure that each element of the business works towards the overall strategic objectives of the business.

information

Agribusiness considerations for formulating functional strategies as part of your over-all strategic plan

Changes in the informal supply environment have accompanied changes in the broader industry. The entry of large, private, often international agribusinesses from the formal economy has caused fragmented, informal suppliers to consolidate and formalise. To meet supply requirements arising from changing demands, agribusinesses often prefer to source through lead farmers or farmer cooperatives or directly from individual farmers. The alternative—purchasing from wholesale markets—can pose difficulties, be inefficient, and most important cost more. When sourcing from wholesale markets, agribusinesses have little quality control, face uncertainties in supply and price, and lose the ability to trace products (which consumers increasingly demand).

When farmers are insulated by layers of intermediaries, it is difficult to communicate to farmers what items or quality levels the market demands. Reducing the number of intermediaries ("disintermediation") allows companies to reduce, deploy their market power more directly to garner lower prices, and improve quality control.

Direct procurement and improvements in production, transport, and supply-chain technologies make it possible to source competitively from vast numbers of suppliers and increase the relative importance of factor costs such as labour and raw materials. Companies looking to economise move production to places where factor costs are lower, which presents an enormous opportunity for farmers in developing countries (World Economic Forum 2009).

"Commercial supply chain" refers to a supply chain in which a private agribusiness is sourcing agricultural produce from farmers or selling products to farmers in accordance with a profit-seeking business model. "Supply chain" typically refers to the set of buy-sell interactions as goods flow from raw materials through production to the final retailer where consumers can buy them. "Value chain" generally refers to the whole ecosystem of players involved moving from the retailer backwards to the producer. These terms are often used interchangeably, and a special distinction is not made in this module. Such chains can be of various types.

Although participation in commercial supply chains presents an opportunity for smallholders to attain higher incomes (between 10 and 100 percent; see World Bank 2008:127) and reduce

poverty, these outcomes are not certain unless other important factors are addressed. For example, actual income changes depend on the crop, the time needed for farmers to learn to produce the crop more efficiently, and the quality and other standards required. Changes in income may not be sustainable unless accompanied by improved practices such as postharvest handling or risk management.

All strategic plans have the same overarching purpose, namely to set the enterprise on a course that will enable it to set and achieve its objectives. All strategic plans also contain the same basic elements that have been outlined. There are however different methods or processes that can be followed to arrive at the end result. It is sometimes useful to combine aspects of these different approaches to accommodate specific circumstances.

Three alternative approaches are outlined below, being:

- A traditional approach
- Bath Consultancy Group method
- Participlan® method

A Traditional Approach

Strategic plans cannot be formed in a vacuum. They must fit the organisation and its specific circumstances. Two separate stages characterise strategic planning, being formation and implementation. It must be remembered that strategic planning is an alive and flexible process that continuously has to be revisited, revised and adapted.

But the process has to start somewhere. The fundamental steps to establishing strategy within an enterprise are to:

- Define what business you are in and where you are at present (mission)
- Decide where you want to be and what it will look like (future objectives or vision)
- Assess your present and future (or expected) operating environment
- Critically evaluate your competition
- Define the core values of your enterprise and its people

Once these steps have been taken, you will be able to provide a means for moving from where you are now to where you have decided you want to be, in essence, the strategic plan. The action plans that are required to implement the plan can then be developed and implemented.

As an aid in dealing with these issues, it is useful to consider Thomas Peters' (of "In Search of Excellence" fame) Seven S model. This assists the process of diagnosing a company's problems in the run-up to developing and implementing the strategy.

The Seven S's are:

- Shared values – A common approach to how things get done
- Systems – Processes and procedures for getting things done
- Skills – Intellectual assets
- Style – Culture
- Staff – People assets

- Structure – Designed to complement the plan
- Strategy – In response to changes in the operating environment

These are not presented in any order of priority or hierarchy. The elements are all interconnected and in any effective enterprise, each of the S's complements the others and consistently advances the company goal. The seven S's constitute a checklist to ensure that during the process of strategic planning due attention is given to each of these critical issues.

Other tools traditionally used generating and ordering ideas during the strategic planning process are:

- Developing a SWOT analysis.
- Porter's five forces that drive enterprise competition, being the threat of substitutes, the threat of new entrants, the bargaining power of suppliers, the bargaining power of buyers, and the intensity of rivalry among competitors.
- The Ansoff Matrix, that provides a clear way to classify routes for enterprise expansion, for example extending plantings of citrus (The 10-Day MBA, S. Silbiger, 2002). Here, what determines the strategy is the "newness" of the product (cultivar) or market. An existing product (for example, Valencia oranges) can either go into an existing market (UK) or a new market (China), and a new product (seedless, late Clementines) can do the same. There are therefore four possibilities: Existing products into existing markets (penetration strategy), existing products into new markets (market development strategy), new products into old markets (expansion strategy), and new products into new markets (diversification strategy).

Bath Consultancy Group Method

(With acknowledgement to "Key Concept Paper", Bath Consultancy Group, December 1994.)

This method involves capturing both verbal and written comments to key questions put to management, staff and other relevant participants at appropriate sessions, and comprises the following steps:

- Clarifying the mission
- Agreeing on the vision
- Creating a holistic model of business assets
- Analysing the environmental aspects
- Analysing competitors
- Review
- Strategy quadrant
- Action plan

Clarifying the Mission

The mission is considered to be a statement of the business you are in. It represents the current situation and provides the framework in which strategizing takes place. The clarity of the mission and individuals' understanding of this can

be checked by the answers given to the following questions with three to five bullet points:

- The primary purpose of our enterprise is to…
- The key core values of our enterprise that guide how things are done are…
- Strategy: our enterprise focuses on…
- Its unique competencies that distinguish it from others in the field are…

From the inputs received a mission statement would be created.

Agreeing to the Vision

The vision statement is created from getting answers to the following:

If our enterprise was miraculously successful in achieving its purpose, implementing its strategy and living out its core values, what we would see, hear and feel is…

Creating a Holistic Model of Business Assets

Since it is widely recognised that the value and performance of an enterprise cannot be gauged by considering its financial performance or material assets only, Bath Consultants developed the "Bath Corporate Transformation Model" that takes a deeper look at enterprise assets.

These are split into two groups, those most visible to outsiders, namely relationship assets, brand image and financial or material assets, and the organisational learning assets that are less visible to outsiders, being people assets, intellectual assets and change and learning agility.

Listing these assets provides a strategic audit. By considering the relationship between these assets, and how changes in one can affect others, important information becomes available about the current state of strategic health of the enterprise, its strengths and weaknesses and where it is now.

Environmental Analysis

This process is similar to that already dealt with where the acronym PESTLE is used to prompt the inputs. To make the process manageable, each participant is asked to list just three issues per heading and to prioritise these on a 0 (low) to 10 (high) basis.

Competitor Analysis

Having looked at your competencies (strengths) and the changing context in which you operate, it is important to look at your competitors. This is done by asking such questions as: "Who are your major competitors? How might they take market share from you or undermine any of your six assets? What sort of competition beyond the present horizon could compete with your enterprise in a way not yet thought of?" (See also Porters' five forces of competition referred to above.)

From this information, it is possible to list which assets we need to capitalise on, recognise, and leverage. It will also identify the gaps, needs and problem areas

that have to be addressed. It would furthermore be possible to decide which of the competitive challenges needed to be addressed most urgently.

Review

Having provided answers to the previous questions it is now possible to state:

- What the key challenges are for our enterprise
- What it is that we can uniquely do to for the business to meet those challenges
- Where we can add most value

We can also make a list of the things we need to continue doing, stop doing and do differently in order to bring about the changes we have identified.

Strategy Quadrant

It is now possible to draft a strategy quadrant. On the vertical axis, there are two levels of competence, namely existing and new. On the horizontal axis, we have two levels of opportunities, namely existing and new. This is similar in structure and purpose to the Ansoff Matrix mentioned above.

- In the block of existing competencies and existing opportunities, we would be looking to exploiting these along the entire value chain, expanding the field of involvement.
- For new competencies and existing opportunities, we would be looking to building, protecting and extending our core business.
- For new opportunities and existing competencies, we would be looking at ways of redeploying or recombining our current competencies to capitalise on the opportunities.
- For new competencies and new opportunities, we would be looking at what we could uniquely do that tomorrow's world needs.

The issues listed in these quadrants would effectively be the things that need to be done (actions). The group would then have to decide which of these would most effectively take the company from where it presently is to the vision previously defined.

Action Plan

For this, the so-called Ishikawa Fish is drawn. This depicts the head of the fish as being the vision, and the tail of the fish as being the current position. The backbone represents the set or list of actions needed to move from the current situation to the vision. This list of required actions would have been identified during the previous process of allocating items to the strategy quadrant.

For each agreed action an action plan is required. The action plan must identify what has to be done, how, by when, by whom, and how progress will be monitored. This is achieved by invoking the so-called 6-P model for planning. The 6-P model is a simple yet powerful model for planning any project, change process or a new strategy. It consists of three guiding strategic Ps and three operational Ps. The exercise is applied to each action plan.

Strategic	Purpose	• Why are we doing this? • What is the overall purpose of the project? • What outcome will it achieve?
	Principles	• What are the business rules that should inform this project? • What core values should guide how things should happen?
	Parameters	• What are the boundaries and limits of this project? • What will this project include and not include? • What are the constraints of time, people and money?
Operational	Project Deliverables (Programme)	• What are the tangible outputs that this project should deliver? • What are the indicators of a successful result?
	Project Plan	• What are the key activities in the project? • What is the timetable for the activities in the project? • What should happen by when?
	People	• Who is the leader and who are the team members? • Who is responsible, meaning who will carry out the action? (R) • Who is accountable, meaning where does the buck stop? (A) • Who should be consulted before actions or decisions are taken? (C) • Who should be informed after decisions or actions have been taken? (I)

For each action, there is now a detailed sub-strategy, including how it will be accomplished, by whom, by when and how progress will be measured. The outcome, measured at intervals, as decided, will inform adaptations that might need to be made to the specific action plan concerned.

Participlan® Method

(With kind permission of Business Presentation Group, Cape Town)

This is a method that has been developed to harness collective thinking. It makes complex issues such as strategic planning faster, easier and more participative. It is a technique that eliminates hierarchy in meetings, focuses on the objective and being an anonymous, visual mapping method enables all participants to contribute without fear of identity or victimisation.

It is used in decision-making, conflict resolution, innovation, problem-solving, information gathering and strategic planning. Specific models to deal with these various requirements have been developed. The strategic planning model has been used with success in the South African fruit industry on numerous occasions.

The method consists of the group responding in writing to a number of carefully structured questions. Each participant writes his responses on specially designed oval cards that are collected and displayed on large display sheets.

The facilitator allows debate on the meaning of the cards and clusters cards with similar meaning. Finally, the full range of responses from all participants is captured on film and used as the substance of the report.

The following are typical questions posed in strategic planning sessions:

- Question 1: What are the typical scenarios we could face over the next 3 to 5 years?
- This is another way of doing an environmental scan and calling for threats and opportunities.
- Question 2: What are we currently doing well and what are we not doing well?
- This is another way of calling for strengths and weaknesses.
- Question 3: Twelve months from now, we are described as the best at what we do... What are we doing and what do we look like to warrant this praise? This is another way of setting the vision.
- Question 4: What measures will tell us we have achieved each of these goals?
- Question 5: What competencies and skills will we need to meet these goals?
- Question 6: What stumbling blocks stand in the way of us meeting these goals?

The points arising in question 3 are prioritised so that the top four or five issues are identified as the key goals. The prioritised issues are allocated to volunteer or appointed participants who elect others in the group to join them in creating proposed action plans.

The action plans are then presented to the full meeting as preliminary action plans. Management endorses the appointment of project leaders and project teams for the formal implementation of the agreed action plans.

As suggested by the above examples, there are countless ways of structuring strategic planning sessions, and most borrow aspects from the tried and tested methods developed over time by a variety of academics and business practitioners.

An organisation's strategic planning will prove worthwhile if the people in the enterprise keep the process alive and relevant through ongoing conversation and continuously adapt the plans they have collectively formulated to fit the changing business environment.

Using the Strategic Plan to Legally Produce the Desired Products

The various elements contained in the total strategic planning process have been dealt with. These include:

- Gathering, analysing, preparing and using information.
- Evaluating the influence that market trends have on production and production processes.
- Evaluating the influence that technology has on production.
- The development of a strategic production plan and the tools available to achieve this.

It now remains to conclude by bringing the most relevant aspects together to reaffirm the process of developing a strategic plan.

Setting Objectives

Visions, objectives, goals and targets are all terms with similar meaning but with different time frames and different relative levels of significance. There is a cascading order from the long-term picture, or vision, to the short-term target or milestone. The process of strategic planning enables the creation of a vision and the translation of the vision into a series of lower level objectives and goals, each one congruent with the overall vision.

Identifying Opportunities

Identifying opportunities arises from the SWOT analysis, where opportunities would arise either from issues that fit well with identified strengths or overcoming identified weaknesses.

Methods for Dealing with Problems

Very often solutions to problems are provided by those closest to the action. Any strategic planning exercise, therefore, requires a high level of participation from staff at various levels. This not only brings about a line-of-sight between management and staff but ensures buy-in at all levels thus facilitating implementation.

Ensuring Legality

An appropriate level of knowledge of the legal requirements of the production and marketing aspects is needed. This covers both labour issues and concerns about fruit quality and consumer health.

How Key Elements Operate within Each Alternative Structure

In recent years, following deregulation of the food industry in many developing nations (Reardon et al. 2009:5) and the lowering of trade barriers in developed ones (World Bank 2008), private, market-driven agribusinesses have replaced state-supported

entities. On the demand side, an increasingly urban population worldwide requires food to be delivered farther and farther from the farm. With rising incomes and changing preferences, this population also demands higher levels of food safety, quality, and traceability.

practical

Complete the following formative assessment:

F263456.2 – Team Organogram and Mind Map Presentation

Chapter 7
Business Performance Supervision and Monitoring

Defining Business Performance Supervision and Monitoring as Part of Strategy

definition

Business performance supervision and monitoring

Supervision and monitoring can be defined as: supervising activities in progress to ensure they are on course and on schedule in meeting the objectives and performance targets.

Maintaining the production cycle in a way that promotes the production of a high percentage of marketable fruit, is a complicated and exacting process and demands intensive and expert inputs. The elements involved in the production of a crop of the required quality are the following:

- Healthy orchards
- Correct production inputs at the right time
- Trained personnel
- Appropriate and well-maintained equipment
- Well-designed information systems
- Sufficient funds to ensure necessary supplies

Evaluating Supervision Practices in Agribusiness

Natural Resources Supervision

Healthy Orchards

Maintaining a healthy orchard for optimum production of quality fruit is based on the following:

- Good quality, well-drained soil
- Well prepared soil
- Good plant material
- A fertiliser programme based on soil and leaf analysis
- A well-designed irrigation system and proper irrigation scheduling

- A balanced pest and disease control programme
- Maintenance pruning to provide light penetration into the trees
- Proper orchard sanitation to remove fallen and infected fruit continuously

Monitoring the Application of Production Inputs

The proper timing of all actions involved in the production process is essential.

In order to obtain sufficient flower initiation, blossom and fruit set, nutrient status of the trees and moisture supply must be optimal. Fertiliser applications must, therefore, be carefully executed, and irrigation scheduling done according to accepted methods to ensure sufficient available soil moisture.

Fruit set throughout the tree canopy, which will yield clean and large fruit, is dependent on light penetration, which depends on a proper pruning programme.

The spray programme for pest and disease control must also be well-planned, well-timed, and cost effective to result in a clean and profitable crop.

Ensuring the correct and timely production inputs depends on the following:

- Professional approach
- Well-trained management, supervisors and employees
- Planning and supervision
- Good recording and observation system
- Enough well-maintained and effective orchard equipment
- Stock availability when required
- Accessible technical knowledge and advice

Human Resources Supervision

Trained Personnel and Performance Management Systems

Trained employees, with the level of training appropriate to the task which has to be performed, are essential for successful citrus production.

Training must be supported by ongoing mentoring, supervision and support to ensure that the tasks are well executed.

All training actions must be documented.

In earlier modules of this programme, we explored the concepts of performance management. Performance management is a good way to monitor and supervise human resource development and progress of the business.

Expenditure of Financial Resources Supervision

Equipment

Mechanised tasks can only be executed well with equipment which is designed for the task and in good working condition. Consider the following examples:

- Doing light work with a tractor designed for heavy work is not cost-effective and may cause damage to the equipment. The opposite is true

with heavy work with a tractor delivering insufficient power, which will also have a poor result with heavy wear and tear on the tractor.

- Spray machines must be calibrated to deliver the required amount of spray mixture onto the target area on or within the tree and be matched with a tractor that can deliver sufficient power for the task.
- At the packhouse, the in-feed rate of fruit must be matched to the capacity of the packing line to ensure efficient handling.

The same principles apply to all equipment utilised in the production, harvesting and packing process.

Information System

A well-designed information system which provides the required historical and current data on all aspects of the enterprise forms the basis of a well-managed farm.

Always remember: if you cannot measure, you cannot manage.

This includes financial information on costs and income, production figures per orchard, fertiliser and spray programs, weather data, and personnel matters. All production inputs have to be recorded and records must be available for scrutiny at all times.

Current food safety legislation and compliance for registration for GlobalGAP requires a system which enables traceability back to the orchard of fruit delivered to the market.

Funds

Sufficient funds must be available to support the production activities at all times.

Being a seasonal enterprise, income is only generated from about two to four weeks after delivery of the first fruit which, depending on the cultivar mix and production area, could be anytime between mid-March to mid-June.

Payments are normally finalised by the end of January of the following year. Cash flow must, therefore, be managed carefully to have the necessary funds available at all times.

Marketing Budget Expenditure Supervision

Systems for keeping track of stock requirements, ordering stock in time, controlling the issue of stock items, and monitoring current stock levels must be in place on all farms and requires careful planning before the production unit is established.

While production stock items, such as agrochemicals, maintenance items, fuel and consumables are managed with the help of a stock control system, machinery and equipment are recorded in an asset ledger.

Stock Control System

Stock control systems assist in monitoring the levels of the stock items on hand. Stock control systems can be computerised or manual. Computerised systems are generally more accurate and easier to maintain. There are a variety of software packages available to assist with stock control.

Any stock control system must have the following components:

- Purchasing – Information of stock purchases must be entered on the stock control system, including the date, invoice number, supplier, and cost price.
- Issuing – The system must allow for the issuing of stock in a well-documented manner. Stock items must only be issued to authorised persons, and they must sign for the items when they are issued.
- Current Stock Levels – From the purchases and issues, the system must be able to calculate the expected current stock level. An added benefit is if the system can calculate the value at cost price of the items currently on hand.

During a stock take, also referred to as an inventory count, all the stock items on hand is counted. The actual stock levels are then compared with the expected levels as calculated by the system. Variances that are found may be due to insufficient control, the incorrect input of purchases or stock issues, theft, or incorrect counting during the stock take.

Another added bonus to some computerised stock control systems is that stock take data can be processed in the system, which then produces a report that compares actual and expected stock levels.

Keeping stock items well-organised and safely stored is essential for proper stock control. If items are not well-organised, it is very difficult to count the stock accurately, and it will take considerably longer.

Stock control, especially of agrochemicals, is very imported in terms of GlobalGAP requirements. These requirements must be observed when deciding which system to use.

Asset Register

Assets are stock items that are kept for a long time, as opposed to other items that are used up in short periods. Machinery and equipment qualify as assets, while fertiliser and spare parts are not assets. Fixed assets include equipment, machinery, vehicles, and office equipment and furniture.

Assets are generally expensive items, and there must be systems in place to keep track of these assets. An asset register, sometimes also referred to as an asset ledger, is a record of all the fixed assets on the farm, including its date of purchase, its cost price, its depreciation rate, and its date of sale when it is sold.

When the financial records of the farm are audited, the asset register is checked against the actual assets on the farm.

Management Reports and Financials

Management reports within any book year provide an overview of activities and results within that specific year and cover the progress in comparison to what was projected in the budget. Budgets usually cover the following:

- An overview of the previous years with regard to production, marketing, income and profit margins
- Projection of results foreseen in the new year
- Possible adjustments in approach to handle the foreseen circumstances

- Capital investment for longer or shorter term improvements or an increase in production
- Projected results in production, income and profits
- Projected cash flow

Depending on the time of the year, management reports include progress with regard to all the aspects covered in the budget. It also highlights possible changes in production or the market with recommendations to handle the situation, as well as the effect these will have on income, profits and cash flow.

Break-even Analysis

Generally, break-even analyses calculate on a year-to-year basis what the minimum on-farm income before tax should be to cover all the production costs incurred for the product or range of products. The direct production costs and income vary between cultivars and is recorded as such on a per hectare basis. Overhead costs, such as management and administration costs are difficult to allocate per cultivar and should be apportioned as a fixed cost on a per hectare basis.

In the case of a new planting, a break-even analysis determines after what period the accumulative income will cover the investment and development costs of the planting. It is important that the break-even point is reached as quickly as possible. The outcome of the process is, therefore, a product of the quality and cost of the inputs and provides an incentive to make the product development process as efficient as possible.

It stresses profitability. The personnel are encouraged to work together to produce a product that meets customer needs. This includes offering the product in an attractive sales channel at an attractive price and at a cost that enables the farmer to earn profits that will repay the development and investment cost.

Using a Project Plan and Objectives as a Monitoring Tool for Improvement

In the previous chapter 4, we said that quality management is concerned with quality assurance throughout the production process and quality control, which is aimed at ensuring that the product meets certain standards.

The Hazard Analysis Critical Control Point (HACCP) system was also mentioned as a good example of an effective quality assurance system. In this chapter, the integration of quality assurance in the production process will be discussed by using the HACCP system as a tool. The process of maturity indexing will be used as an example of quality control.

The Citrus Production Process

Before a quality management system can be implemented, the stages of the production process must be identified so that the points at which quality can be adversely affected can be identified.

Each stage in fruit development is influenced by the preceding stage and influences, in turn, the following stage. The stages are:

- Flower induction and initiation

- Flowering
- Fruit set
- Fruit growth
- Harvest
- Flower induction and initiation for the following year's crop

A broad distinction can be made between factors affecting internal and external fruit quality caused by pests and diseases on the one hand, and physiological problems on the other. Physiological problems are those brought about by the effects of climate, nutrition and irrigation. In this section, the focus is on these physiological factors, although similar principles are applicable to pest and disease factors.

Crops can be manipulated in various ways including fertilisation and irrigation, pruning, thinning (by hand and chemically), girdling, hormone application (to reduce flowering, increase fruit set, extend the harvest season, and extend the shelf-life of the fruit), fruit acid reduction and fruit colour improvement.

The table on the next page is a typical management schedule, in this case for easy-peeler production in the northern areas of the country. The table indicates the timing of various treatments to achieve desired fruit set, fruit size and quality.

The citrus production manager should create such a management schedule for each of the citrus cultivars he produces. Over time, a database of the specific treatments and treatment timings applied annually to achieve a premium quality product should be developed. In this way, the risks attached to the production of high-quality fruit will be systematically reduced.

Guide to Annual Soft Crop Management Programme – Northern Areas												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
A. Fruit Set and Size												
Urea Sprays KNO_3 Sprays					X (1%) X (4%)	X (1%) X (4%)					X (4%) for Size	
Pruning and Blossom Thinning						XXXX		X	XX (Blossom Thinning)			
Girdling for Set					`				XX 2 Weeks			
N Applications (Soil)			Leaf Samples		¼ N – Soil (After colour break)				XX ½ N Soil	XX ¼ N Soil		
Fruit Thinning (by hand)	XXXX		XXXX (Sunburn)									XXXX
Corasil Y Sprays / XGR Thinning / Sizing											XXX	
Irrigation (for fruit set and growth)	"Quality Stress" (see below)			-50kPa					-30 to -50 kPa			-50kPa
B. Fruit Quality				**Harvest**								
Reduced Irrigation (Increased Sugars)	Stress -60kPa XXXX XXXX XXXX			Irrigate before harvest								
Calcium Arsenate – Reduced Acid											XX	
Maturity Indexing		XX	XXXX	XX	(6-8 weeks before harvest)							
Ethrel Sprays (Colour) + Ca Acetate for sensitive cultivars				XXXXXXXX (Colour break) Acetate one day before ethrel								
Degreening (Packhouse)				XXXXXXXX (from colour break)								

Summer Girdling (Higher sugars)												XXXX
C. Harvest Timing Extension				XXXX	XXXX	GA_3 at colour break or December						XXXX
Early Harvest			See ethrel / ethylene / calcium arsenate / summer girdling methods above									

X = Week of the month during which activity is carried out.

For the purpose of explaining some of the practices which impact on fruit quality, it is necessary to understand the fundamental interactions between the environment, tree growth and fruiting.

Certain factors or conditions, either alone or in combination, give rise to strong and vigorous vegetative growth in the tree. Such factors include warm day and night temperatures, sufficient water, young tree age, high levels of nitrogen, no nutrient deficiencies, and the absence of root or leaf diseases. When trees grow vigorously the quality of the fruit is usually poor. Fruit colour is slow to develop, the sugar content is low, and the fruit has an insipid taste due to low acid levels. Fruit is usually too large, have coarse rinds, and tree yields are only fair.

Conversely, when trees are less vegetatively vigorous due to light water stress, low night temperatures and a properly balanced nutritional status, better fruit colour and a higher internal fruit quality will result. Fruit will have smooth rinds, be well-coloured, and in a more acceptable fruit size range.

The challenge of the production manager is to understand the influence of inherent factors, being tree age, rootstock, cultivar selection, climate, soil type, on fruit quality for the specific cultivar concerned, and to be able to use appropriate production practices to influence or mitigate any possible negative effects of these inherent factors.

In the case of quality defects caused by the effects of pests and diseases, the monitoring of the levels of the specific pest and disease agents and their natural enemy populations is a vital aspect of being able to provide cost effective and ecologically sustainable control options.

The citrus production manager, therefore, needs to be familiar with the pros and cons of the various procedures and practices to improve fruit quality, both in respect of those required to address the harmful effects of pests and diseases and those aimed at counteracting the detrimental effects of adverse climate and nutritional imbalances.

Integrating Production Processes and Quality Assurance

As mentioned in chapter 4, quality assurance aims to assure that the quality of the product is protected and maintained throughout the production process and must, therefore, be integrated with each process involved in citrus production. Using the HACCP system as an example, this means that the seven principles of HACCP must be applied to each process.

The HACCP system is aimed primarily at maintaining the integrity of the process, meaning it aims to ensure that the process is conducted and completed as it should be and within certain limits.

example

Quality assurance

Refer to the irrigation process in the table above under section A (Irrigation for fruit set and growth) for September to November. HACCP principles for the process can be applied as follows:

example

HACCP Principle	Application in Irrigation
Hazard analysis	• Water supply to plants can fall below critical levels, causing damage to plant and leading to lower fruit set and smaller fruit. • Plants can be saturated with water, causing anaerobic conditions in root-zone and adversely affecting plant health.
Identification of critical control points	• Water delivery at tree (soil-water balance)
Establishing critical limits	• Tensiometer readings in root-zone: -30 to -50kPa
Monitoring critical control points	• Regular tensiometer readings recorded on a data sheet
Establishing procedures for corrective action	• Report to management • Investigate pump system, water availability, emitter delivery, damage to irrigation system
Record-keeping	• Tensiometer readings, other irrigation monitoring equipment readings • Incident reports to management
Verification	• Verify that corrective action has resulted in tensiometer readings within the critical limits

Please note that this is a simplified example for the purpose of illustrating a point. Many other critical control points can be identified and controlled in this process, such as pump delivery, emitter delivery, valves, and so on.

Hazard Analysis

What can go wrong in this process?

Hazard analysis is about identifying the possible quality hazards that can occur in the process.

Identification of Critical Control Points

Where in the process can quality be compromised?

Identifying the critical control points is about finding the points in the process that must be controlled to ensure that the quality hazards that were identified in the hazard analysis are prevented, eliminated or reduced to acceptable levels.

Establishing Critical Limits

What are the limits for the measurable values at each critical control point?

Establishing critical limits is about determining how critical control points can be monitored and about setting the critical limits for each control point. Critical limits mean limits beyond which fruit quality will be compromised.

Monitoring Critical Control Points

How are the critical levels at each critical control point monitored?

Monitoring is about developing a system that will record the values for which critical limits have been established at each critical control point. The system should be able to record the relevant data, convert it into useful information where necessary, and flag values that are approaching critical limits and that are posing a quality risk. The information generated by this system forms an important part of the record-keeping system.

Establishment of Procedures for Corrective Action

What must be done if the critical limits at a control point are exceeded?

An action plan must be in place that can be implemented immediately if a critical limit is exceeded to ensure that damage to the quality of the fruit is prevented or at least limited.

Record-keeping

What must be documented about the system and what records must be kept?

Records will firstly include the written HACCP plan which sets out all the critical control points, their critical limits, monitoring procedures and corrective actions. Every person that is involved in a process must be well versed in the HACCP plan and must be aware of what his role is in implementing the plan.

Further records include those generated at each critical control point and reports on corrective actions that were taken.

Verification

How do I make sure that the quality management system is effective and remains relevant?

Verification means the documenting of the validity and effectiveness of the HACCP plan. If it is forever found that fruit quality was compromised in spite of the implementation of the quality control system, the reasons for this must be established and adjustments to the HACCP plan must be made.

Integrating Production Processes and Quality Control

As mentioned earlier, quality control is concerned with inspecting or monitoring fruit quality at various points in the trade chain. This includes formal inspections by agencies such as the PPECB against the standards that are prescribed by the relevant legislation, but also on-farm quality control, which is aimed at measuring the response of trees and / or fruit to the various inputs made, for example, maturity indexing.

Maturity indexing is a technique used to provide information on the rate of change of fruit maturity prior to harvest. Maturity may differ by as much as three weeks from season to season, primarily due to the time of flowering and the weather conditions subsequent to it. This can have a major impact on management decisions relating to such issues as the contracting of labour for harvesting, the preparation of the packhouse, and logistical arrangements for transporting the packed fruit from packhouse to market.

Fruit sampling commences four to six weeks before the expected harvest date. Fruit samples are tested for acid and sugars and the ratio is calculated, and fruit colour is rated. The results of these quality factors are plotted on a graph. By doing so the test data is converted into information which will begin to show clear maturity trends after a few weeks. This enables appropriate management decisions to be taken in good time.

example

Clementine maturity indexing

In the table below is the typical average weekly fruit size, colour, sugar and acid, and ratio values for Clementine's as a reference for maturity indexing purposes.

Long-term reference framework for picking maturity and combined weekly average maturity progress (Industry)

Clementine

Week	Date	Size (mm)	Colour	Hydro TSS (%)	REFRAC TSS (%)	Acid (%)	Ratio
10	8 Mar	43.6	8.0	10.5	9.8	2.35	4.47
11	15 Mar	43.4	7.8	10.1	9.3	2.13	4.75
12	22 Mar	42.3	7.9	10.3	9.6	2.04	5.03
13	28 Mar	45.2	7.9	10.0	9.2	1.73	5.76
14	4 Apr	45.9	7.5	10.4	9.5	1.52	6.85
15	13 Apr	50.4	7.5	10.3	9.5	1.40	7.38
16	19 Apr	49.2	7.2	10.4	9.6	1.24	8.37
17	25 Apr	53.0	6.2	10.6	9.8	1.21	8.75
18	3 May	52.1	5.2	10.9	9.9	1.11	9.78

example

19	10 May	52.3	4.6	10.4	9.8	1.00	10.39
20	17 May	53.1	4.2	11.0	9.9	0.98	11.21
21	23 May	56.5	3.3	11.2	10.4	0.98	11.36
22	31 May	52.5	2.9	10.6	9.9	0.92	11.52
23	7 Jun	53.1	2.6	11.1	10.4	0.85	13.14
24	14 Jun	52.6	2.5	11.5	10.8	0.87	13.31
25	21 Jun	50.6	1.1	13.5	12.2	0.90	15.08

The minimum national standards are given in the table below as a control.

Internal Quality Standards					
	Juice	**TSS**	**Acid (Min)**	**Acid (Max)**	**Ratio**
Clementine	48	9.5	0.70	1.50	8.0:1

On the next page is a typical maturity indexing information sheet template. The internal quality test data from each sampling is entered onto the sheet and the relevant points connected once sufficient samples have been taken to show trends.

Similar graphs can be developed for colour development and other maturity information. The graphs give an indication of the expected maturity date and of the expected internal quality of the fruit. By adding information such as notations on external blemishes, one can also get an indication of external quality.

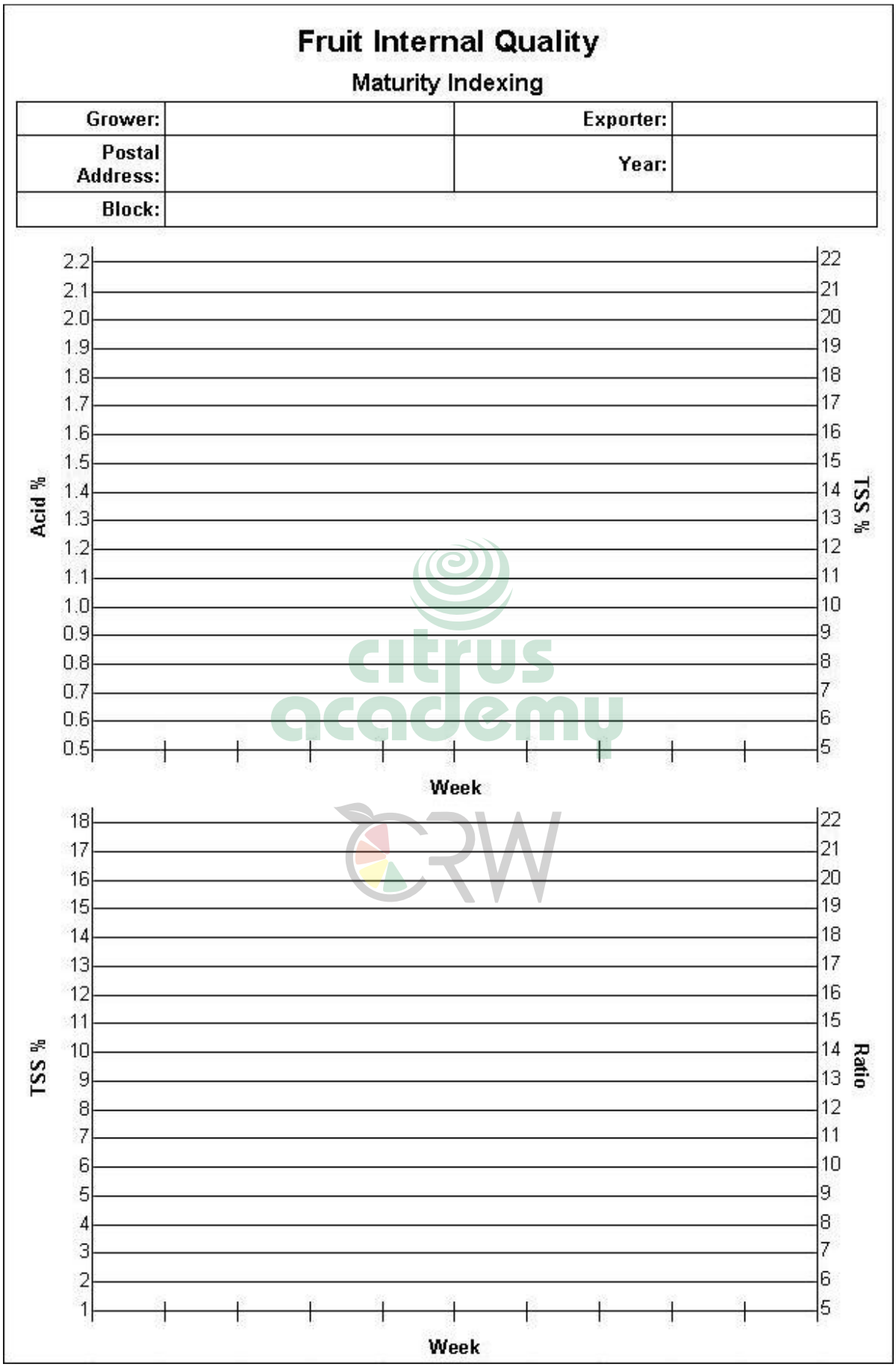


Figure 4.1: Maturity Indexing Information Sheet Template

Cost-Benefit Analysis for Quality Improvement Processes

The term cost-benefit analysis is used frequently in business planning and decision support activities (www.solutionmatrix.com). The term does not refer to any specific approach or methodology, but usually implies a study to provide some form of financial justification for an action. Financial justification is a business-case analysis that helps the production manager to decide whether or not to proceed with a proposed action.

In deciding which quality improvement processes to employ, the citrus production manager should conduct some form of cost-benefit analysis to determine whether the cost of implementing a specific action is financially justifiable.

The nature of the analysis would depend on the manager's ability to quantify the cost of the planned treatment against the financial benefit accruing from the action.

It is relatively easy to accurately estimate the cost of a prospective treatment, whether this is a chemical spray, pruning or the implementation of an amended fertilisation or irrigation schedule.

Estimating the financial benefit that could arise from the chosen treatment or treatment combination is usually less precise. This is because the quality of the final product is the result of a number of interacting factors, some of which are out of the control of the manager, such as climatic conditions.

The recommended approach is to use past records as an indication of the potential financial losses that could be incurred from quality defects or to estimate the cost of non-compliance to the relevant market standards.

practical

Complete the following formative assessment:

F263456.3 – Team Framework Presentation

Chapter 8
Monitoring, Measuring and Reporting Business Performance

Why Monitor, Measure and Report on Business Performance?

Production planning for citrus should at all times be based on the net on-farm returns from the markets for the types of citrus which can be produced successfully in the area which the farm is situated. Anticipated prices for the various products from the markets accessible to the produce from that specific area, are therefore important to start planning.

The next step is to determine what quality fruit need to be produced to provide entry into the various markets and to assess whether and how much of required quality can be produced. This information will only be available from medium- to long-term information on the production and quality trends in the area and on the farm.

It is for instance known that under normal circumstances high-quality grapefruit can be produced in the Lowveld of Mpumalanga and Limpopo, but that Navel oranges from that area seldom reach the required quality to provide entrance to high-income markets. On the other hand, navels from the Citrusdal area are normally of high internal and external quality and can be marketed in the United States of America with high returns back on the farm.

There are therefore a host of production and marketing factors which influences the ultimate decisions on what to produce and which markets to target to achieve a profitable result.

Qualitative and Quantitative Performance Indicators for Agribusiness

Production cycles are influenced by a large number of factors. Observations and records of both historical and current season activities and crop response must be kept to enable the farmer to plan and react in order to produce a marketable crop.

A culture of record-keeping must be developed and kept intact to achieve and maintain the standard which is required. It must be a part of everyday management and execution of all activities. The record-keeping system should be as simple as possible to encourage the employees to use and maintain it – it should not be seen as a hassle. Regular feedback to employees indicating the results and use of the information gathered is a motivation and provokes interest.

The correct use of data and information is one of the main characteristics of a well-run and successful farm. There are various types of data which has to be collected to provide information to management on a citrus farm.

The relationship between data and information can be defined as follows: information is the result of processing, manipulating and organising data in a way that adds knowledge to the receiver. In other words, it is the context in which data is taken. It is, therefore, important to collect data in such a way that it can be processed to provide the required information.

Management information would include the following:

- Financial data (budgets and cash flow)
- Administrative data
- Production data (inputs, for example, labour, materials, machinery and outputs, for example, crop produced)
- Productive use of inputs
- Human resource data
- Personnel records
- Manning levels for harvesting and packing

The ultimate aim is to ensure efficient and sound management to generate a profit. An efficient information system will, therefore, assist management to monitor the costs of input processes, materials and other resources, and the income generated through correct production and packing practices and judicious marketing.

The flow of data and information must be assessed and monitored throughout and evaluated for whether it meets the requirements of management.

Financial Information

The flow of data from all areas where costs are incurred as well as income generated should be such that it can be collated in a monthly report to facilitate budget management. Data should also indicate cash flow figures – this enables management to balance income and expenditure.

Administration

The administration is the link between management and operations on a farm. Poor administration can cause a breakdown in communication of relevant information. All management reports are prepared by the administration department. They also have to ensure that relevant information on all aspects of the farming enterprise is filed and stored securely and available when needed.

Production

The management and control of the production process through a well-organised monitoring process is basic to good farm management.

The information systems within the production department form the basis of the broader management information systems, providing management with the necessary details to make meaningful decisions to manage, adjust and improve the enterprise. Production information must include the following:

- Use of personnel for all production processes like irrigation, spraying, pruning and harvesting
- Use and maintenance of machinery and equipment records
- Correct application of production chemicals
- Use of irrigation water records
- Crop statistics per cultivar per orchard
- Crop estimates including external and internal quality as well a fruit size

- Expected time of harvesting

How to Measure and Report on Financial Indicators for Agribusiness

A farm database contains information from multiple sources concerning production practices, orchard layout, financial records and historical records. Information about farm layout and the availability of resources also forms part of the database. One of the important factors included in the database is a listing of suppliers. Supplier listings give an indication of the size and scope of the enterprise. By inspecting the supplier and services provider listing one can determine the effectiveness and profitability of processes on a farm.

When collecting data to design a database for a farm, computers are used to correctly structure and store information. Having well-trained staff that are able to efficiently use computers is a great asset to any organisation. The correct use of a database captured on a computer can relay relevant information effectively and in a range of different formats.

Organising Information

Tables, graphs and maps are all tools used to convey information. The layout of the information depends on the type of information and the audience or person to whom it is directed.

Graphs

Whereas tables provide exact data, graphs are mainly used to convey the general significance of data, such as general trends, relationships and proportions. The significance of a well-designed graph should be immediately clear, while the significance of a table becomes clear only by examination. People also tend to remember the meaning of data presented in graphs better than data presented in tables.

There are a great many types of graphs and variations on standard types. The type of graph that one uses depends on the sort of data that is being conveyed, and the significance (trend, proportion or relationship) that one wants to show. The major graph types that we will discuss in more detail are:

- Pie chart
- Bar or column graph
- Line graph
- Area graph

Pie Chart

A pie chart is a circle divided into a series of segments with each segment representing a particular category. It is a way of summarising the percentage distribution of each category in a set of data. The area of each segment is the same proportion of the circle as the category is of the total data set.

The use of the pie chart is quite popular because they are simple to use and the circle provides a visual concept of the whole. Despite its popularity, pie charts should be used sparingly for two reasons.

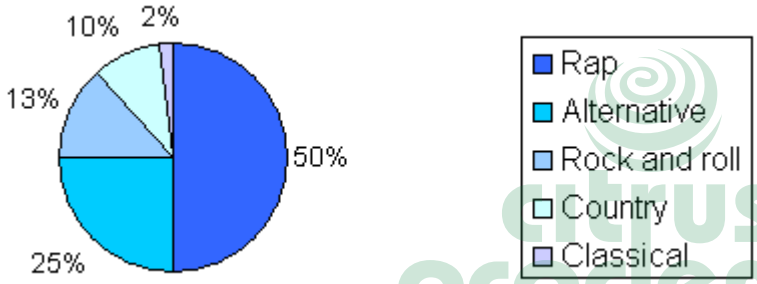
Firstly, pie charts are best used for displaying information when there are no more than six categories. More than six categories tend to make the chart too complex to understand. Secondly, pie charts are not useful when the values of one or more of the categories are too similar because the differences between slice sizes are not significant enough.

To make a pie chart, the share of each category is converted to a percentage of 360 degrees.

example

Pie chart

The pie chart below shows the music preferences of young adults, ages 14 to 19.



The pie chart clearly shows that the majority of students like rap best (50%), and the remaining students prefer alternative (25%), rock and roll (13%), country (10%) and classical (2%).

Bar (Column) Graph

Bar, or column, graphs usually present categorical and numeric variables grouped in class intervals. They consist of an axis and a series or labelled horizontal or vertical bars. The bars depict frequencies of different values of a variable or simply the different values themselves. The numbers on the x-axis of a bar graph or the y-axis of a column graph are called the scale.

A bar graph may be either horizontal or vertical. The important point to note about bar graphs is their bar length or height – the greater their length or height, the greater their value.

When developing bar graphs, a vertical or horizontal bar for each category or value is drawn. The height or length of the bar will represent the number of units or observations in that category (frequency) or simply the value of the variable. The bars can be any width, but this must be consistent between all the bars.

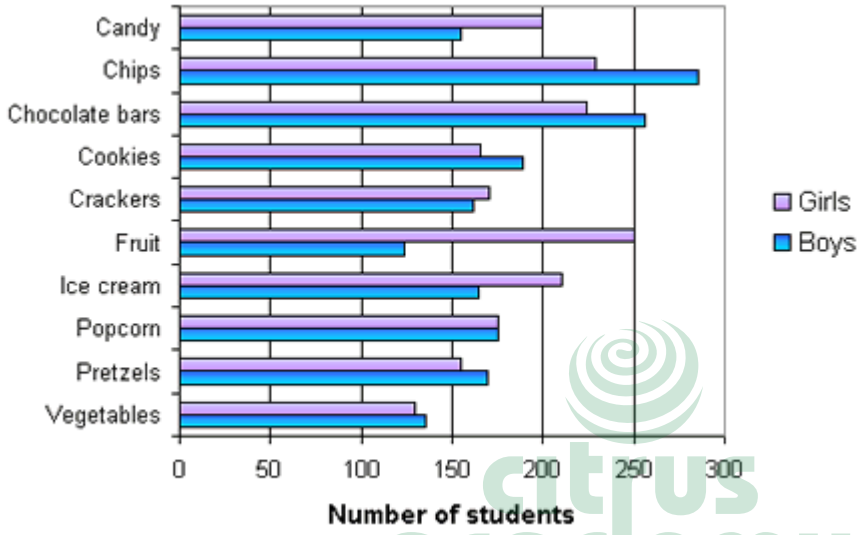
Bar graphs can be either horizontal or vertical – both types work well when you need to compare values. However, in general, data comparisons are best represented vertically. One disadvantage of vertical bar graphs is that they lack space for text labelling at the foot of each bar. When category labels in the graph

are too long, you might find a horizontal bar graph better for displaying information.

example

Bar graph

Below is a bar graph that shows the preferred snack choices of students at Citrusdal High School, also indicating the difference in snacks preferred by girls compared to boys.



Line Graph

A line graph is a visual comparison of how two variables, shown on the x- and y-axes, are related to each other. Line graphs show related information by drawing a continuous line between all the points on a grid. Line graphs can take different shapes and be used to convey a wide array of information.

Line graphs are the most popular type of graph because they are easy to create and their visual characteristics reveal data trends clearly. Line graphs are especially useful in the fields of statistics and science and are one of the most common tools used to present data.

Although they do not present specific data as well as tables do, line graphs are able to show relationships more clearly than tables. Line graphs can also depict multiple data series. Time series data and frequency distribution are most commonly depicted using line graphs.

Bar, column graphs and line graphs share a similar purpose. The column graph, however, reveals a change in magnitude, whereas the line graph is used to show a change in direction. A multiple line graph can effectively compare similar items over the same period of time.

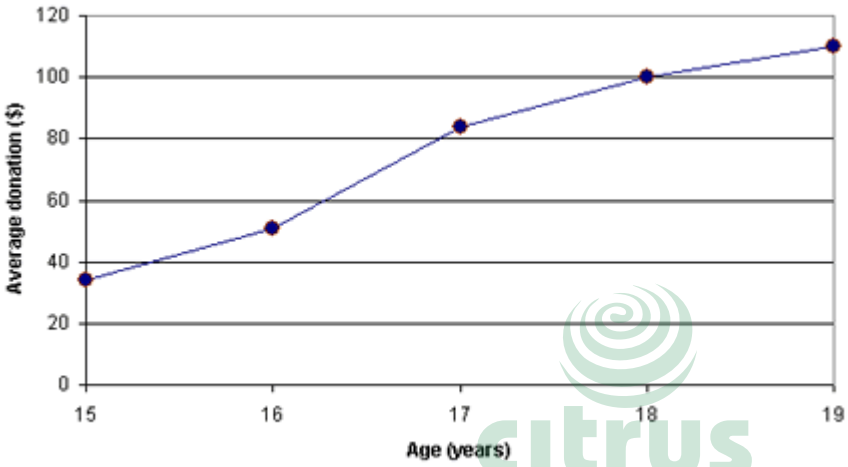
Be careful when selecting the scales for the x- and y-axes when creating a line graph, because this can give a distorted image of the data. If inconsistent scales on the axes of a line graph force data to appear in a certain way, then a graph can even reveal a trend that is entirely different from the one intended. This

means that the intervals between adjacent points along the axis may be dissimilar, or that the same data charted in two graphs using different scales will appear different.

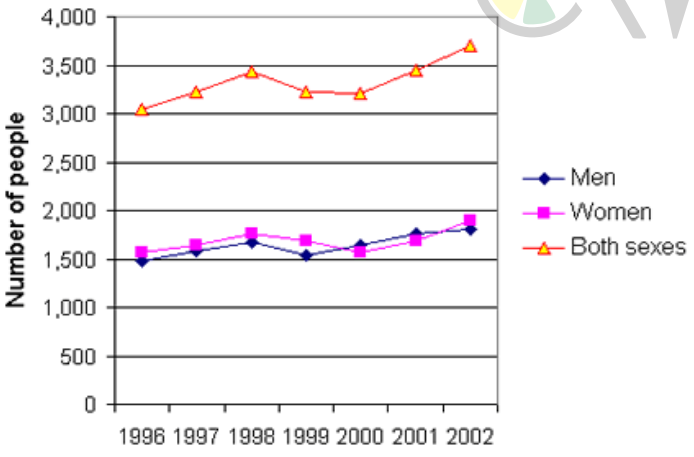
example

Line graphs

Below is a single line graph comparing the number of dollars donated by the age of the donors. According to the trend in the graph, the older the donor, the more money he or she donates.



Below is an example of a very good multiple line graph. It is easy to see from this graph that the total cell phone usage has been rising steadily since 1996, except for a two-year period between 1999 and 2000, when the numbers drop slightly. The pattern of use for women and men seems to be quite similar, with small discrepancies between them.



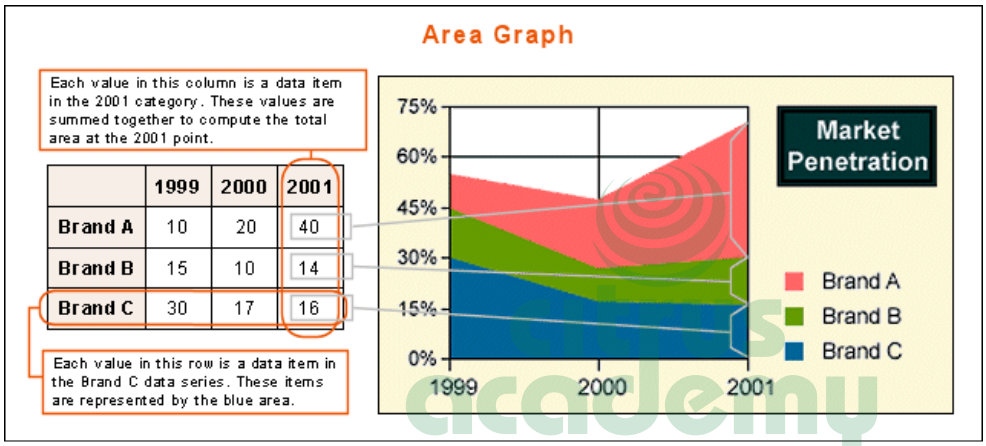
Area Graph

Area graphs combine the features of line graphs and stacked bar graphs by colouring the areas underneath each line. These area segments are stacked on top of each other, as in a stacked bar graph, so that the total size of the area at each category reflects the cumulative value of all data items in that category. Each data series in the graph corresponds to a coloured segment of the total area. The first series is always the top area segment.

example

Area graph

This graph compares market penetration between different brands.



Tables

In its simplest form, a table is a group of rows and columns of data. At the top of each column is a column heading, which defines or identifies the contents of that column and often it indicates the unit of measurement as well. On the left edge of the table, row headings are placed, which define or identify the contents of that row. Tables depict sets of figures in relation to certain parameters. It contains more detail than what is normally shown in graph form. If used in text or projected in submissions, it must contain only the information that is relevant and be as uncluttered as possible.

Tables permit rapid access to and relatively easy comparison of information. If the data is arranged chronologically (for example, sales figures over a ten-year period), the table can show trends, patterns of rising or falling activity. Tables are not necessarily the most vivid or dramatic means of showing such trends or relationships between data, which is why charts and graphs are more commonly used for this purpose.

Tables are mainly used for numerical data. Imagine that you are comparing sales of different products over a number of months, including the total sales of each product for the period, and the total sales each month. A table is perfect for showing this data. However, tables are not strictly for numerical data. Tables can be used whenever different details of several items must be listed. For example, you can compare the characteristics of the products for which you listed the sales

in the previous example. This is ideal information to be captured on a table, and it would be mostly words rather than numbers.

The following are handy tips for creating tables:

- Refer to the table in the text just preceding the table. Explain the general significance of the data in the table. Do not expect readers to figure it out entirely for themselves.
- Do not overwhelm readers with monster 11-column, 30-row tables. Simplify the table data to just that amount of data that illustrates your point, without distorting that data.
- Do not put the word or abbreviation for the unit of measurement in every cell of a column. For example, in a column of measurements all in millimetres, do not put "mm" after every number. Put the abbreviation in parentheses in the column or row heading.
- Right- or decimal-align numbers in the columns. If the 123 and 4 were in a column, the 4 would be right below the 3, not the 1. Normally, words in columns are left-justified.
- Column headings are normally centred over the column's data, although this may vary depending on the type of data (numerical or text) in the column.
- When there is some special point you need to make about one or more of the items in the table, use a footnote instead of clogging up the table with the information.

example

Table

Below is an example of a simple table showing a production comparison.

Year	Total Production (quad. Btu)	Percent of Production			
		Coal	Petroleum	Natural Gas	Other[1]
1960	41.5	26.1	36.0	34.0	3.9
1970	62.1	23.5	32.9	38.9	4.7
1980	64.8	28.7	28.2	34.2	8.9

1. Includes hydropower, nuclear power, geothermal energy, and others.

Figure 3. Energy Production by Major Source from 1960 to 1980. Source: U.S. Energy Information Administration, *Annual Energy Review.*

Maps

A map is a graphic representation of a portion of the earth's surface drawn to scale as seen from above and a presentation of the physical and cultural environment where man finds himself. A map reduces the image of a large area so that is observable in one glance, and uses colours, symbols, and labels to represent features found on the ground. Features cannot be represented in true shape and to be understandable must be represented by conventional signs and

symbols on a scale which can be interpreted and, in practice, converted to actual distances on site.

A map provides information on the existence, the location of, and the distance between ground features, such as populated places and routes to travel and communication. It also indicates variations in terrain, heights of natural features, and the extent of natural cover.

Maps are used extensively on farms to indicate the location of orchards, irrigation mainlines, power supply lines and the layout of other infrastructure.

In general, maps are divided into two main categories, being topographic and thematic maps. Topographic maps are considered general purpose reference maps. The information that is found on such maps is, for instance, coastlines, rivers, lakes, roads, railway lines, buildings, canals and political boundaries.

In South Africa, topographic maps are mainly prepared and published by the Director-General of Surveys.

Thematic maps are also known as special purpose maps or statistical maps. A thematic map depicts a graphic theme on a specific subject, for example, soil, geology and population distribution. To ensure that such a map is cartographically correct, a topographic map is normally used as a base map.

Reporting Lines and Priorities within Agribusiness

Procedures, Timeframes and Standard Formats for Documenting and Reporting Business Progress

Observation of a developing crop is aimed at monitoring the effect of orchard practices and weather conditions on the fruit, as well as the pest and disease status throughout the growing season.

It is important to know what the results were of similar practices during previous years as well as the effect of varying weather conditions on fruit development and quality. Recording rainfall, temperature, humidity, evaporation and wind velocity on a continuous basis is essential.

Crop volume and quality will, for instance, affect the nutritional status of a tree as reflected by leaf analysis. Adjustments to the fertilisation programme are made to accommodate the change in nutrient status, according to known parameters and according to the reaction of the orchard to previous adjustments.

Historical and current records of crop volume, fertiliser applications and crop response are therefore necessary to develop an effective programme.

Pest and disease status is monitored through a scouting system where trained employees go through the orchards regularly to inspect fruit and trees. The results are recorded to establish whether there is a build-up of specific diseases or whether the control measures are adequate.

Traceability is a major requirement of food safety legislation and is also required for GlobalGAP registration. Traceability means the ability to trace the origins of fruit, from where the consumer buys it in an overseas marketplace, right back to the orchard where it was grown.

Types of Records

The following records are normally kept:

- Records of pre-plant investigations, including the environmental impact study, soil surveys, water quality assessments, planning for handling of runoff water, the soil erosion impact assessment.
- Origin of plant material and nursery practices up to the point of delivery of plant material to the farm.
- The qualifications of all consultants or staff recommending actions for establishment and production processes.
- Proof of the training of workers that are required to perform tasks in the production process for each specific task.
- Instructions given to workers in writing with acknowledgement that they understand the instruction.
- Reports of execution of the instructions.
- The numbers or names of all orchards with indication of year of planting, cultivar, rootstock, number of trees, planting density and size, together with the historical yield information.
- Records of fertiliser and spray material applications.
- Test and calibration reports of all equipment utilised.
- Pre-harvest monitoring of external and internal quality also called maturity indexing reports.
- Harvesting records and details of packhouse deliveries.
- Cull analyses per orchard from packhouse as well as records of internal quality.
- Records of all postharvest treatments and packhouse procedures with indication of dates of delivery together with packing records.

Interpretation of Records and Reports

Observation reports on citrus farms include reports on growth phenomena such as blossom dates and fruit drop, routine inspection of insect and fungal disease infestation, and surveys on the extent of hail or other physical damage to fruit. The reports are compiled from data received from the orchards that are collected by either well-trained scouts or other trained personnel. An efficient inspection and recording system is the cornerstone of successful citrus farming.

Inspections assist in the following three ways:

- Inter-seasonal decision making based on comparisons of results between seasons
- Intra-seasonal decision making based on fruit set, growth, and pest and natural enemy trends
- Immediate decision making based on intervention thresholds

The accuracy of orchard inspections depends on the scouts or other personnel used to inspect the orchards. They must be well-trained in basic identification of pests, damage symptoms, natural enemies and any other phenomena they are expected to observe

and record. Monitoring of the work of the scouts is very important to ensure that the information supplied after inspections is correct.

Orchard maps facilitate the organisation of inspection systems, the interpretation of inspection data, and the subsequent execution of control operations. The maps can be used to record various aspects of orchard operations, the position of inspection sites or routes, and fluctuations in pest or disease presence. Copies of the maps can be utilised to show the development of a particular pest or growth phenomena in a specific area.

Placement of inspection sites should be as prescribed for each specific malady so that the results will represent the actual condition in the orchard.

The results of each inspection round should be recorded for permanent reference. Over time, regular inspection and the related written records will provide a good basis for fine-tuning treatment thresholds for pests and other production, harvesting and crop projection requirements.

Below is an example of an orchard inspection form used to record mealybug infestation in an orchard.

example

Orchard inspection form

The calyx and sides of ten fruit on each of ten reference trees are inspected and the occurrence of mealybug is recorded.

Sweet Street Farm												
Name:		Pete			**Orchard:**		Tophouse					
Pest:		Mealybug			**Date:**		7 November					
		Fruit										
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**C**	**S**
Tree	**1**			C	C			S		C		3	1
	2	C							C			2	
	3					C		S				2	1
	4										C	1	
	5				C						C	2	
	6		C									1	
	7			C								1	
	8												
	9					C			C	S		2	1
	10									C		1	
Total												**15**	**3**
C = calyx S = side of fruit													

Weekly inspections provide a good picture of the pressure of infestation and whether corrective measures are necessary. The same form can be used for recording most other orchard pests.

How to Monitor and Report on Customer Satisfaction with the Produce – Market Information

The requirements of the market influence the decisions on what to produce and the production practices that are employed. Production practices are mostly impacted in terms of market requirements that relates to food safety and quality.

A prime example in this sense is maximum residue levels (MRL). MRLs are the residue of a given chemical that is allowed to be in the fruit when it is exported. MRLs are legislated by the Department of Agriculture, Forestry and Fisheries, who issues a list of MRLs for all plant protection products that are used in crop production. If it is found that a consignment of fruit exceeds the MRL for a plant protection product, the consignment will be rejected for export and action can be taken against the grower.

Production practices, and in this case specifically the application of plant protection products, are influenced by this market requirement in that the spray programme will be planned in such a manner that no plant protection product is applied too close to harvest time. The market information that is gathered in order to decide what to produce and to assist with production planning include the following:

- Market preferences
- Expected income per unit in the various markets
- The cost chain to various markets
- Price fluctuation over the production season
- Quality requirements of the various markets (food safety, fruit size, internal and external quality)
- Production trends in the local as well as overseas production areas

Market Preferences

The various export markets each have their own set of preferences for fruit type. The Japanese market has, for instance, a specific preference for grapefruit and soft citrus outside their own production season. The American market prefers navel oranges and soft citrus.

The European market will absorb a good quality fruit in more or less any fruit type except white grapefruit, which has a marketing niche in Italy. The Scandinavian markets prefer fruit of a larger size spectrum than the Russian market, whereas the complete size spectrum can be marketed in the rest of Europe.

Fruit marketed in the Middle, Far East and Japan must be relatively blemish-free and have good colour. Waste fruit is heavily discounted in these markets.

Growers can get access to this information by studying trade publications and historical market information. It is, however, most of the time easier to rely on market agents for this information. Knowledge of these preferences by the chosen market agent is imperative for success.

Expected Income per Unit

The income per unit is determined by the placement of an accepted fruit kind of the right quality at the right time on the right target market.

The selection of an area to establish a new enterprise or replacement of an orchard will always be profit driven. The potential of the area or orchard to produce a highly marketable and profitable product will determine the final decision.

The Cost Chain

Income on the farm for any product is determined by market price and the cost chain to the market. Elements included in the cost chain are transport to port, handling, pre-cooling and loading at the port, shipping, discharge, transport to the market, and market handling costs.

These elements differ for the various markets and play a large role in determining the profitability of any farming enterprise.

Marketing in Japan and United States of America involves very strict and carefully monitored cold storage and in-transit sterilisation protocols, which adds substantially to the cost chain. The protocol was introduced to kill any fruit fly and false codling moth larvae that may be present in the packed fruit. A high market price is required to offset this cost to yield a profitable on-farm return.

Price Fluctuations

Prices on any market are determined by supply and demand. All markets are supplied by a number of countries, each with its own unique set of factors which determines the price it could accept to enable them to generate a profitable return.

The return is also heavily influenced by the quality of the product. The strong point of South African citrus is that it normally competes on most markets in the so-called off-season of their local farmers or nearby countries.

It is important when projecting any price to consider the price chain involved in supplying fruit to the target market. The cost of transport to the various harbours in South Africa varies between production areas. In-harbour costs of cold-storage and loading differ depending on destination.

Only produce from the Western Cape is allowed into the United States as a result of the phytosanitary exclusion of areas where bacterial blackspot occurs.

In determining where to establish and what to plant in any of the established areas the above factors have to be weighed up carefully to determine what the projected income and eventual profit margins could be.

Quality Requirements

The quality requirements of the various markets differ, but all markets require a sound, well-handled, and safe product.

Food safety is legislated through the Agricultural Products Standards Act. This act prescribes all requirements for ensuring that food is safe for human consumption. The most significant prescriptions of the Act are maximum residue levels (MRLs) for each plant protection product and traceability.

GlobalGAP registration is a must for most European countries and the United States. This requires traceability of all actions throughout the production and handling chain right back to the orchard in which the fruit was produced.

Production Trends

The volume of products on the markets is one of the determining factors of price. Planting any citrus orchard is a long-term commitment, making it very important to take notice of new plantings locally as well as in other citrus producing countries.

practical

Complete the following formative assessment:

F263456.4 – Team Research Examples Presentation

Chapter 9
Identifying and Correcting Performance Problems Occurring in Your Business

The Importance of Identifying and Rectifying Problems

Much of what managers do is to solve problems and make decisions. Decision-making is a key role of a manager and leader. Some managers find this to be one of the most difficult tasks to perform. They have a fear of failure and procrastinate mainly because they lack a structured approach. One of two things usually happens, they either put off making the decision in the hopes that someone else will bail them out, or even worse, make a decision using a kneejerk reaction.

It is best to think of making a decision as drawing a line between two points. If you cannot draw a straight line between the two points, then that decision should most likely be rejected. When the line goes off into tangents, there might not be a realistic link between the proposed action and outcome.

New managers often try to solve problems and make decisions by reacting to them before they fully understand all of the possible factors. They feel that the quickness of a decision is more important than the long-term outcome. There are times when a quick decision is needed, such as dealing with a violent act in the workplace. However, most decisions are not needed immediately and you do in fact have the time to make the right decision. That is the key to making the right decision. Just be careful to not let decisions accumulate, or else you will have a backlog of both small and complex decisions to make. You need to find the perfect balance of knowing when to make quick and easy decisions on the fly, and when to take time with the complex decisions.

Do not be afraid to talk to your boss or upper management about major problems or needs that concern you. You do not want to be known as a manager who "keeps secrets" because you are scared of the possible repercussions. It is better to be upfront and honest, while at the same time showing you are diligently working on the resolution. You may even find yourself working with other department managers to rectify issues affecting your department. There is nothing wrong with this as it shows your commitment to your department and the company.

Define the problem or need before you make the decision. Ask yourself, and others if needed, the following who, what, when, where, how and why type of questions. Here are 12 steps to follow to use as a guideline when making important decisions:

1. Who should make the decision? First of all, you might be looking at a problem or need that is not your decision to make. Be sure you are not stepping on anyone's toes, even though your heart is in the right place. If you are the one to make the decision, go to the next step.
2. What makes you think there is a problem, or why the need? Before you can start to make any decisions, you need to be absolutely clear the problem or need is valid. Make sure you consider those who will be affected by the decision. Talk to some key staff members to make sure you and your staff fully understand the nature of the problem or need. You want people who will speak up, are efficient, take

necessary risks, have somewhat opposing views, and are strongly motivated. There are times when it seems like the problem or need comes at you like "the sky is falling," but when you take the time to truly investigate the problem or need, you might find it is overly exaggerated. This happens quite often as emotions take over logic. For instance, is it one person complaining about a particular situation or does everyone feel the same way? Is there a common complaint from your customers or just one or two disgruntled people who will never be happy? Is there a common trend or is it just speculation? Do you really need to invest in a new database or can you work with what you have got? Dig deep to find if there is a true problem, and then start on finding ways to improve. You do not want to fix something that is not broke. If you indeed suspect there is a problem, follow steps 3 through 12:

3. Where is the problem or need? Is it internal or external? Is it in your department or somewhere else? Is it only in certain areas of your network? Is it one employee or the whole group? You need to know where the problem or need lies before you can begin to make the right decision to fix or buy.
4. When is it happening or needed? Is it certain parts of the day? Is it when there is over-usage? Is it when shifts overlap? Is it always at the end of the month? Is it every time there is a new software release? By pinpointing when the problem happens, it helps greatly in detecting the root cause of the issue.
5. What is causing the problem or need? Is the problem process related? A lack of training? Old and slow computers causing longer handle times, which in turn is affecting customer satisfaction? Are there not enough employees to handle the number of calls? Is it a design or engineering flaw? Is it quality control issues? You need to get with key staff members to truly determine the root cause of the issue. Determining you have a problem is useless if you, or another department, cannot find the cause.
6. How complex is the problem or need? The more complex the problem or need, the deeper you will have to dig. Do not be afraid to go back to the drawing board until you are fully confident with the choices you have made.
7. What is the urgency and how should you prioritise? Some problems are more important than others. You would not want to work on a complex minor issue when you have an easy major issue that should be dealt with immediately.
8. What is the ideal outcome? When you are faced with a big decision, it is easy to get lost in the detail and circumstances. Write a list of pros and cons, advantages and disadvantages, and short-term and long-term goals to make sure the outcome has the desired effect. Think about the objectives, alternatives, and risks. You need to be absolutely clear on exactly what it is you are expecting to achieve. Review the facts at hand then absorb them into your subconscious mind. Let these thoughts simmer for a while before going to the next step.
9. What are the possible solutions to the problem or need? Brainstorm with your key staff members for solutions to the problem or need, unless you are dealing with a confidential or personal issue. Note all of the ideas and alternatives on your whiteboard and then screen out the top solutions. Go over the pros and cons once again with everyone. Know the cost and risk associated with each alternative, and then be prepared to decide on what it is you are going to do.
10. Make the final decision. You should now know the direction you are going to take. Commit to your final choice or course of action. Recognise that you cannot know with 100% certainty that your decision is correct. You cannot predict the future, but you can do everything possible to assess the problems or needs along

with the benefits and risks. So make the decision, do not worry about the "what ifs," and do not look back. Do not prolong or deliberate about the decision anymore. Trust yourself to make the decision. You will be able to deal with any consequences appropriately and with confidence because you did your homework.

11. Plan and implement the final decision. Now that you have decided on what you are going to do, you need to determine how and when you will make it happen. Be realistic in your approach. Can you accomplish the task now? Do you have the resources? Is it in your immediate budget? Are there any time constraints? Do you have the facilities? What steps need to be taken? What systems or processes should be changed in your organisation? Once you have a plan and know how to implement the solution to the problem or need, it is time to put the plan into effect. Write a schedule that includes the start and stop times, and when you expect to see certain indicators of success. If you are delegating the task, make sure the person realises they are responsible for ensuring the implementation of the plan. Make sure the plan is communicated to all involved, including your boss and upper management if needed.
12. Monitor and verify whether the problem or need has been solved and / or is effective. It is a good idea to set up daily or weekly meetings to make sure all is well. Make sure all is going according to plan and is on schedule. You can then move to monthly meetings until you are 100% sure the problem or need has been solved. You will find out very soon how successful you are by checking reports, surveys, comments made in meetings, and whether there is any tension in the air. Use this opportunity to learn how to avoid future related problems. If you are still having problems, or your expectations have not been met, call in your key players again. Look at whether the plan was unrealistic if you had the right resources, was it communicated enough and did you prioritised correctly. If needed, the plan should be changed. Go through the steps again until you fully resolve the issue and find the exact solution.

Examples of Performance Problems that may Impact Citrus Production

Evaluating Resource Use

When evaluating whether the available resources are managed sustainably, it must be established whether the climate, soil and available water has been managed in a way that resulted in optimal fruit growth and production. The evaluation must also assess whether production practices caused excessive damage to the environment. To ensure that the required results are being achieved, an ongoing evaluation of the production process has to be implemented, through monitoring all aspects of resource use and management, and the consequent effects.

Evaluating Suitability of Management Practices

The establishment of a new orchard or enterprise must always be preceded by a careful study of the available resources and the environment.

The results of this study lead to a set of assumptions which forms the basis of all the decisions about the establishment and management of the new orchard or enterprise. These decisions have to be evaluated on an ongoing basis to confirm their correctness

and relevance and, if necessary, adjusted where possible. Considerations must include the following:

- Where and how to establish the orchards
  - Positioning of the orchards in relation to the topography
  - Row direction to provide optimum light interception for growth and production
  - Minimum disturbance of natural vegetation
  - Management of runoff from irrigation and rain to prevent erosion
  - Subsurface drainage to prevent excessive wetness in soils
- Soil preparation for optimum production
  - Effectiveness of chemical ameliorates through regular soil and leaf analysis
  - Observation of vegetative growth
  - Production statistics on a yearly basis
- Management of the water resource including dams, pipelines and irrigation systems as well as runoff and drainage water
- Management of reticulation system of irrigation water to the orchards
  - Irrigation application and scheduling in the orchards
  - Effectiveness of measures to control runoff in prevention of erosion and sub-surface wetness
- Cultivars / rootstock combinations best suited to the area
  - Monitoring of production volume and fruit quality
- Establishment and operational costs per year to full production
  - Costing of all actions on an orchard basis
- Production per year after planting with projected percentages marketable fruit and income
  - Record production and fruit quality per orchard on a yearly basis
- Staff complement to handle the plantings
  - Enough staff to handle all actions
  - Temporary staff during peak activities
  - Sufficient training to ensure maximum productivity
- Vehicles, tractors and equipment
  - Matching availability with orchard management and requirements

Meaningful adjustment of and within resource management has to have a good administration and record-keeping system as its base. It should also be supported by a well-developed inspection and maintenance programme to ensure that all physical danger areas are identified and inspected regularly. An example is areas where erosion is likely to occur after heavy rainstorms which has to be inspected immediately after such a storm and, if necessary, repaired.

Evaluating Production Cycles

The production cycle for citrus is a year-round process and is closely related to the growth cycle of citrus.

The production cycle is designed to provide the tree with what it requires to optimally support the current growth stage.

The production cycle is related to the growth stages of the tree as set out in the table below. Please note that in this table the approximate phenology of a Valencia orange tree was used to develop the production cycle and that the phenology of various types and cultivars of citrus fruit can differ appreciably.

Month	Cell Processes	Fruit and Flower Development	Production Processes					
			Fertilisation	Pest and Disease Control	Irrigation	Pruning	Harvesting	Packing
July	Flower Initiation	Flowering						
August	Cell Division							
September								
October		Fruit Set						
November								
December	Cell Enlargement							
January		Fruit Growth and Maturation						
February								
March								
April								
May								
June								

Table 1.1: Production Cycle of Valencia Citrus Tree

Production cycles also have a direct bearing on cash flow and profitability. It is important to evaluate the combined effect of the production cycles of the cultivars which can be grown in a specific area to establish the cultivar combination which will be best suited for providing the highest profit to the enterprise. Such a combination should:

- Provide a constant flow of fruit during the harvesting season
- Result in optimal use of manpower and machinery throughout the combined production cycles
- Generate income over the longest possible period for healthy cash flow

The factors which therefore have to be considered when appraising cultivar combinations for suitability are the citrus type (orange, soft citrus, grapefruit or lemon), the cultural practices necessary to produce optimum crops and the timing of those practices, the time of maturing and the picking period.

Production records should not only provide a record of physical production, but also an indication of the quality of the fruit produced historically on a yearly basis. This not only provides a base for evaluating physical orchard performance but can also be used for economic analysis against pre-planting assumptions to calculate projected profitability. Production records should therefore include:

- Orchard detail, for example, planting date, rootstock / scion combination, source of plant material.
- Production per year per cultivar per orchard
- Fruit quality per year per cultivar per orchard (fruit size, internal quality, external defect analysis)

The income per cultivar and market should also be recorded in such a way to enable linkage with orchard production to calculate income and profitability per orchard.

We have already said that the decision of what and where to plant to achieve a balanced fruit flow and acceptable profitability is based on a set of pre-planting information and assumptions. These have to be evaluated after every season to establish whether the orchard performance and contribution of each cultivar to fruit flow is satisfactory and has resulted in the required profitability. If not, an adjustment to cultural practices, additional plantings or even removal of an orchard has to be considered.

There are many factors which are interrelated and which all affect the general management and smooth operation of a citrus farm and has to be considered in such an evaluation. They include the following:

- Cultivar performance (volume, timing of production, effect on picking and packing)
- Equipment (handling, transport and cultural practices)
- Human resources (management, supervision and labour requirements)
- Production (volume, quality and production practices)

Procedures to Follow to Identify, Report and Correct Performance Problems

Adjusting Farming Practices

The effect of farming practices on the tree and on the environment has to be monitored throughout the lifespan of an orchard. If necessary, adjustments must be made to optimise profitability and resource usage.

Few soils contain all the essential nutrient elements in sufficient amounts for optimum citrus production and nutrient elements, therefore, have to be supplemented through fertilisation. A fertiliser recommendation is the recipe whereby supplementation takes place. The objective of a fertiliser recommendation is to supply only what is necessary

and to apply the minimum amount required for optimum production. Applying too much fertiliser is as detrimental as applying too little.

To make sure that the right adjustment is made to this farming practice, it is essential that the nutritional status of the soil and tree is evaluated on a regular basis. This evaluation is based on crop records, the condition of the tree and analysis of soil and leaf samples.

Soil and leaf analysis is not a management tool for all production practices. It cannot compensate for poor irrigation, inefficient fertiliser applications or other substandard practices. Soil and leaf analysis are merely methods which can be used to ensure that one of the factors determining production, namely fertilisation, is founded on sound scientific and economic bases. Recommendations based on analyses have to be made by a knowledgeable person after considering all relevant aspects.

Similarly, water analyses allow the farm manager to take the necessary preventative steps to improve water quality if it has the potential to negatively impact on crop production. Weather patterns are another factor that must be monitored on an ongoing basis so that adjustment to management practices can be made if necessary.

Recognising Symptoms of Performance Problems and Getting to the Root Cause of Problems to Make Corrections

Soil and Leaf Sample Analysis

Soil preparation prior to planting is fundamental to the long-term productivity of the orchard. Only by analysing the soil is it possible to determine what should be added to render its chemical composition more favourable for plant growth.

Adjustments after planting are not always as successful as adjustments made before planting. This is especially true of lime, gypsum and phosphate applications, which should be incorporated into the soil as thoroughly and deeply as possible.

In producing orchards it is recommended that soil sample analysis is used in combination with leaf analysis. Provided that proper soil preparation was done, it is then only necessary to analyse the soil every three to five years, mainly to monitor soil acidity (pH), and the potassium and phosphorous levels in the soil.

The nutritional status of an orchard is determined through leaf analysis by using the plant itself as a measure. The sum total of the influences exercised by all possible growth factors is taken into account and tested to see if under this specific set of circumstances the plant has been able to reach the measured concentration of each element. Because these elements are related to production, leaf analysis reflects the potential production under given circumstances.

Leaf analysis is also used to maintain a balanced nutritional status. Optimum status in perennial trees is reached in two to five years, where after leaf analysis is used to maintain this status.

Leaf analysis can also be used as early warning system by showing up nutrient imbalances which may be developing, as well as inefficient fertilisation.

Water Sample Analysis

Water quality describes the physical, chemical, biological and aesthetic properties of water that determines its fitness for a variety of uses and for the protection of aquatic ecosystems. Producing citrus under irrigation depends on the availability of water of suitable quality for sustained production of quality fruit.

In order to evaluate water quality, the potential of the water to lead to the following should be assessed:

- Possible crop losses
- Altered soil conditions which could impact on production and fruit quality
- Use of special management practices to maintain production levels

Problems with water quality are often complex and a combination of factors may affect production more than a single factor. It is important to establish the quality of the water to be used for irrigation at the planning stage of farm and orchard development. The results should be discussed with knowledgeable advisors to ensure that all possible future problems, as well as management thereof, are identified as early as possible.

The quality of water is usually at its poorest just before, and at its best during, the rainy season. If the quality varies greatly between the two periods, the water source must be sampled and tested continuously. In rivers, the quality of water deteriorates as the distance from its source increases.

Other aspects of water quality include, amongst others, the concentration of specific ions and their ratios relative to each other. In evaluating irrigation water, the following determinations have the most decisive influence on its quality:

- Total dissolved salts (TDS)
- Sodium absorption ratio (SAR)
- Boron, chloride and iron

Total Dissolved Salts (TDS)

Any natural water contains a certain quantity of salts in solution. The quantity can be measured in mg per litre but also indirectly by means of the specific electrical conductivity (EC).

Crops differ widely in their sensitivity to high salt concentration in the irrigation water. Citrus is generally classified as a salt-sensitive crop and a 30% increase in the salt concentration of soil can lead to a decrease of at least 10% in total production.

The electrical conductivity (EC) of a soil is closely related to the EC of the water. During irrigation, a certain quantity of salts is also applied. Evaporation and water absorption by the plants concentrate the salts in the soil. If the subsequent irrigation does not remove some of the salts by leaching, situations can develop in which high salt concentration restricts production.

The higher the salt content (EC) of the irrigation water, the more irrigation has to be applied to leach out the excess salts in the soil to maintain 100% production. It is, therefore, essential that the quality of the irrigation water must be known to determine the leaching requirement. Provision must be made in the planning for the additional volume of water. Leaching is a necessary loss and the management of leaching can influence the production of citrus appreciably.

We can, therefore, say that the more salts in the water, the more water will have to be applied during irrigation and the greater is the possibility of salinization. Guidelines for evaluation are given in the table below.

Possibility of Salinization	TDS (mg/litre)	EC (mS/m)
None	0-150	0-25
Small	151-500	26-75
Reasonable	501-1,500	76-225
Big	1,500+	225+

Table 1.2: Limits for TDS and EC Values

Sodium Absorption Ratio (SAR)

An excess of sodium has a harmful effect on soil structure and, together with that, water infiltration, aeration and root growth. Consequently, it is necessary to determine the ratio of the concentration of sodium to that of calcium and magnesium (SAR). The more sodium is present, the higher the SAR will be and therefore the possibility of salinization.

The SAR and TDS (EC) are used jointly to classify irrigation water. When the EC is less than 75 mS/m the salinity hazard is low. The SAR is then also of little importance.

The following symbols are used to classify irrigation water:

(S = Sodium)

- S1: Water low in sodium and suitable for irrigation on any soil and crop
- S2: Water with medium sodium content which could give problems on fine-textured soils
- S3: Water with a high sodium content which will cause problems unless good drainage and leaching is possible. Special attention and management is necessary.
- S4: Very high sodium content and unsuitable for irrigation.

(C = Conductivity)

- C1: Water low in salt which can be used on any crop. Some leaching is required.
- C2: Medium salt water that can be used on all soils and crops provided adequate leaching and drainage are possible.
- C3: High salt water that may not be used on all soils and crops. Adequate drainage, leaching and special management are essential.

- C4: Very high salt water which can be used only under special conditions and management.

Boron, Chloride and Iron

Boron is a micronutrient, but the boron concentration easily reaches toxic levels. Boron toxicity is experienced if the irrigation water contains more than 1mg boron (B) per litre. The maximum limit for boron concentration in irrigation water is 0.3 mg/l for lemons and 1.0 mg/l for other cultivars.

The maximum allowable level for chloride in irrigation water for citrus is less than 3me/litre. Rootstocks show differences in their tolerance to the chloride concentration in the water, as indicated in the table below. A crop reduction of 4.3% can be expected for each me/l chloride increase above 5me/l in the irrigation water.

Rootstock	Chloride Tolerance
Rangpur Lime and Cleopatra Mandarin	25me/l
Rough Lemon, Tangelo and Lemon	15me/l
Sweet Orange and Citrange	10me/l

Table 1.3: Rootstock Tolerance to Chloride

Iron is another dissolved salt which can create problems. At the relatively low concentration of 0.5mg/litre iron can cause blockages of small jets or drippers.

Sampling

All samples for analysis, whether it is soil samples, leaf samples or water samples, have to be representative of the specific area, orchard or water source of which the information is required. The possibility of contamination of the sample at and after sampling must also be eliminated.

In the case of water, the sample must be collected in a clean glass bottle as near as possible to the point of delivery to the irrigation system or storage dam. Identify the sample by attaching a label with all the necessary information to ensure that there can be no problems with identification. The information must indicate the farm, date and point of sampling as well as any additional info or request.

There are a number of independent laboratories that can do the water analyses. Their location can be established through any of the extension offices of the government or other agricultural service providers.

Weather Records

The interpretation of long, medium and short-term forecasts plays an important role in planning production activities on a citrus farm. Also, the projected effect of global

warming on the various citrus production areas may influence the investment decision on where to develop a citrus production unit.

Long term forecasts on yearly weather patterns and rainfall as provided by the SA Weather Bureau are normally used for planning and allocation of water for irrigation.

Medium term forecasts for one to two weeks are also available from the Weather Bureau and private agencies. The information from the agencies are 7 to 10-day forecasts and focused on control of diseases on specific crops, such as Alternaria and blackspot control in citrus. The forecasts are updated on a daily basis and are therefore also used in the short term.

The projected data provided includes the following:

- Average, maximum and minimum temperatures
- Chances of rain with possible precipitation
- Radiation levels
- Relative humidity
- Wind direction and speed
- Evapotranspiration rate

Coupled to the above is a 5-day projection for spray conditions indicating day and time of day and based on projected wind, rainfall, dew wetness and frost data. The Weather Bureau also supplies forecasts on a one to four-day basis in the daily papers as well as on television.

A wide base of information is, therefore, available to the citrus producer to use for planning production activities like irrigation and spraying as well as harvesting.

practical

Complete the following formative assessment:

F263456.5 – Team Research Key Notes

Section 2: Self-Assessment and Progress Check

Describe the concept of strategic planning in managing business performance.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Describe the concept of strategic planning for an agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain the benefits of strategic planning and performance monitoring.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Identify the aspects of a good strategic plan from examples.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Evaluate the relationship between the timing of a strategic plan and the performance of the business unit.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain the role of the various functional strategies in business performance.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain the elements of a strategic plan.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Identify alternative functional structures in an agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain how key elements operate within each alternative structure.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Give reasons for choosing a particular organisational structure for an agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Apply business performance supervision and monitoring.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment

Select and use a business performance monitoring tool.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Evaluate supervision practices in the agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Evaluate the supervision of expenditure in the agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Analyse the marketing expenditure in accordance with the objectives of the agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Monitor the business progress and identify attributes that need development against a project plan.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Monitor, measure and report on business performance.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Consider qualitative and quantitative performance indicators for your agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Measure financial indicators for your agribusiness and report on them.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Monitor customer satisfaction with the produce of you agribusiness and report on it.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Explain a variety of reporting lines within the agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Describe and document reporting priorities within the agribusiness.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Document and report progress of the agribusiness, according to established procedures, within an agreed timeframe and format.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment

Identify and rectify performance problems occurring in business.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Identify, record and notify stakeholders of potential problems in order to try and resolve them.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Identify the symptoms of performance problems and identify possible root causes for them.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Identify, select and apply appropriate problem-solving methods and techniques in order to solve business related problems.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment
Rectify performance problems within a set timeframe.	❒ I have the answer and am ready to start with assessment	❒ I am still not sure of this and am not ready to start assessment