

Management information systems in two New Zealand dairy farm businesses of different scale

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Abstract. Case study research was conducted to investigate the management information systems used in New Zealand dairy farming businesses of different scale. Scale was defined by the number of employees working within the business. Each business had a vision and plans to achieve its objectives. The role of the manager in each business altered with business growth and those roles influenced the information required by managers. Management information systems varied, but core principles remained the same for each business. Both businesses identified challenges with managing, attracting and retaining labour, especially as the business expanded. Each business had its own systems to deal with those challenges.

Keywords: management; information; systems; management information systems; dairy farming.

Introduction

Management is made up of three main functions; planning, implementation, and control (Boehlje and Eidman 1984), which all involve the utilisation of resources in order to achieve some outcome (Robbins and Mukerji 1994, cited in Rawlings 1999). Every function of management has a strong reliance on information in order to survive and grow, with information considered to be a basic resource just like capital, materials and personnel (Adeoti-Adekeye 1997). Relevant information is required by managers in order for them to reduce their uncertainty and increase their knowledge, as without it, it limits their ability to function effectively and efficiently (Adeoti-Adekeye 1997).

A management information system (MIS) enables users to obtain appropriate information on the company's performance and help forecast to address concerns. The system provides appropriate information to all levels of management; strategic, tactical and operational. This information comprises data that has been obtained from formal and informal sources. It enables effective and timely decisions to be made, due to better planning, which in turn can lead to better results (Argyris 1991, cited in Adeoti-Adekeye 1997).

In New Zealand the average farm size is increasing. In the dairy industry over the last 20 year farm size has increased steadily from an average of 63 to 111 effective hectares. Over the last 25 years average herd size has risen steadily from 112 to 302 cows (Livestock Improvement Corporation Limited 2004). Technology also plays a big part in farming operations. There is an increasing need for quality labour on the land. There are continual pressures from the owners of the business on all resources to perform well in order to provide the appropriate returns.

There are many different ways to measure the performance of a business, using both physical and financial data and indicators. These indicators enable the owner/manager to assess how the farm is performing. Often farm owners/managers have targets that they would like to achieve. To achieve strategic targets there are a number of precursor targets to aim for at tactical and operational levels of management. For a farming system where the owner is the manager and sole operator he/she is obtaining the data and processing it at every level to monitor how well the operation is performing. However, as farms grow in scale, in terms of the number of people employed in the operation, there are more individuals involved in communicating the information from the lower levels of management to the higher levels. In return there are more people to communicate decisions and information to.

Clear lines of communication and effective systems are needed to ensure that useful information gets to the appropriate people, in order to make effective decisions for targets to be achieved (The Dairyman 2005). One way of ensuring that targets are being achieved is by having effective and appropriate management information systems (MISs) to enable the owner/manager to continually monitor and manage the operation.

There appears to be limited literature about dairy MISs on farming operations of different scale. In small and medium enterprise (SME) literature and some agricultural business literature it has been highlighted that as the business grows there are challenges for MISs in coping with both the increased volume of information required for processing and the delegation of decision making (Churchill and Lewis 1983, cited in Levy *et al* 2002; Kagan *et al* 1990, cited in Roberts and Wood 2002; Sonka 1985). There is a need to investigate how managers cope with the information and its transmission between parties and with the delegation of decisions to ensure they are able to achieve their targets. Two case studies have been conducted with the following objectives.

Research objectives

To identify: -

1. if scale alters the role of the owner/manager in dairy farming; and
2. what information is collected and why by the owner/manager of different scale dairy farming businesses; and
3. the management information systems in place, facilitating the collection of this information.

Method

Two case studies were analysed, each differentiated by scale. Scale can be measured in various ways, for example, total output, hectares farmed, total assets, organisational structure, etc. However, the aim of the research was to look at information systems in place for farming operations and the flow of information between the various levels of management. The most appropriate measure of scale was by the number of full-time workers involved in the business (Wincent 2005).

Each case study involved semi-structured interviews and qualitative data analysis. Semi-structured interviews allowed for consistency of data collection between case studies, while enabling the researcher to delve into particular responses from the interviewee to clarify and uncover areas that required further investigation. Information was also collected from business documents, financial records and direct observations. These sources, in addition to the interviews, helped formulate an overall picture of the operation. This is known as data triangulation and ensures construct validity, which is where the same scene can be viewed from different angles (Eisenhardt 1989).

Each case study had the same base questions. These questions were developed from theory identified in the literature review and studies done by previous researchers (Doye *et al* n.d. and Whyte and Bytheway 1995). The length of each interview depended on the time taken to answer the questions and for the interviewer to develop a good understanding of the business. For case study two a second interview was held with the office manager to delve further into the systems and procedures in place. In Table 1 a summary is presented of the key characteristics for case studies one and two.

Case study one

Case study one is a 340 cow dairy operation, which is run by the owner (case study farmer), who will be referred to as manager (small), plus a lower order sharemilker. There is a partnership between the case study farmer (manager (small)) and his wife, and there is a contract between the lower order sharemilker and the partnership. The operation is situated in the lower half of the North Island.

The farm consists of 145 effective hectares, made up of a 122 hectare milking area and a 23 hectare runoff. Seventy nine hectares of the milking area are owned and 43 hectares are leased. The 23 hectare runoff is also leased. The milking platform is in one area and the runoff is on the opposite side of a dividing road. The manager (small) has been on the property since 1980 when he purchased 52 hectares and converted it into a dairy unit. In 1989 an additional 14 hectares were bought followed by another 13 ha in 2003. In 1997 additional land, part of a 43 ha block, was leased. Each year the lessor increased the area available for lease and eventually leased the whole 43 hectares. All blocks purchased and leased bound the initial 52 hectares purchased. Cow numbers have expanded over the years.

Production for the 2004/05 year was 123,500 kilograms of milksolids and for the 2003/04 year it was 137,000 kilograms of milksolids. With the change in area farmed and cow numbers, production has varied, but in recent years it has been 1,050 kilograms of milksolids per hectare and an average of 380 kilograms of milksolids per cow. Currently the stocking rate is 2.8 to 3 cows per hectare. During the late 1980's and early 1990's it was up to 3.3 cows per hectare.

The operation has a 32 aside herringbone cow shed with cup removers. There is a loafing pad and a concrete feeding area capable of feeding up to 300 cows.

The manager (small) has a preference for crossbreds. The predominantly Friesian herd has been crossed back to the Jersey over recent years. Jersey bulls are also used for heifer mating and the remainder of the main herd.

Surplus pasture on the runoff and milking platform is made into bailed silage. This is fed out if there is a pasture shortage in summer and in winter. The farm started 2006 with 500 bales of silage. Turnips are often used as a summer crop and are part of the pasture renewal programme. Effluent from the ponds irrigates nine hectares. Half of the cows are grazed off the farm during winter. While the loafing pad and concrete feeding area can cater for 300 cows, doing so makes the system more intensive, which is contrary to farming policy. There are 75 calves reared on the

runoff area. On average 55 rising one year heifers, and 55 rising two year heifers are grazed on the runoff. The other 20 rising one year heifers and 20 rising two year heifers are grazed on a neighbouring property.

Financial security and family are two areas the manager (small) identified as being most important. The operation must remain efficient and effective, yet simple and uncomplicated, to be attractive to those working in/on it and provide the ability to enjoy family and recreational activities.

The manager (small) has eleven factors, which he calls key success factors that he uses in conjunction with a planned programme to run a successful dairy farm. They are:

1. seeking expert advice;
2. having a stocking rate to optimise feed input;
3. monitoring start and mean calving dates;
4. monitoring breeding;
5. applying appropriate fertilisers;
6. draining farm land;
7. harvesting supplements (balage, crops and nitrogen);
8. renovating pastures;
9. monitoring drying off date through cow condition, pasture cover, pasture growth rates, and supplements on hand;
10. having an effective animal health programme; and
11. managing young stock.

The operations farming policy targets simplicity to achieve efficiency.

Case study two

The second case study is a large business situated in the lower half of the North Island. The manager (part owner), who will be referred to as manager (big), has developed the business. It started in the mid 1960's when the manager (big) entered into a large sharemilking position, milking 300 cows and fattening 1,000 pigs. The manager (big) subsequently leased a sheep farm, with a compulsory purchase clause, and converted it to a dairy unit placing a sharemilker on it. This was duplicated in another area, and so while the manager (big) was sharemilking he also had sharemilkers working for him. The business expanded by buying additional pieces of land. The business then started importing machinery into New Zealand and went contracting to promote that machinery.

Over time the sharemilking was restricting expansion. The idea of owning half a business twice the size through bringing in equity managing partners as farm managers was developed. In many cases the business financed the equity partners. During the 1980's when the economy went into recession and consolidation was advised the business expanded again to better utilise existing resources and achieve economies of scale.

In the early 1990's sheep stations were purchased, known as dry stock farms, to provide winter grazing for cows, as this was becoming harder to secure, grazing prices were fluctuating and cows were being sent all over the lower half of the North Island. The dry stock farms ensure there is winter grazing available and land to put cows on when dairy farms in low lying areas are flooded. The last major venture the business entered into was a 2,000 cow dairy enterprise with an 800 hectare runoff.

Around 50 people work in the business. This includes farm staff through to equity/farm managers, office staff and the manager (big). The business is made up of three major companies, four minor companies and the machinery importing company. Some companies are completely owned by the manager (big) and his family, while others are partly owned with equity investors.

The business distinguishes between operational and governance. On the operating side there is the manager (big), who is the head of the business. Below him is one son who runs the machinery enterprise. Another son supervises all the farms north of Palmerston North and another person, who is an equity investor, supervises all the farms south of Palmerston North. These two people are called farm operation supervisors. The 2,000 cow enterprise is managed by an equity manager, who is overseen by the manager (big). Below the farm operation supervisors are the farm managers. The majority of the farm managers have equity invested in the operation and are called equity managers. Two farms have managers without any equity in the business, and are called farm managers. The farm operation supervisors provide more input into these farms with regard to monitoring, expenditure control and reporting to the board. There is then general farm staff below the farm/equity managers.

Governance consists of the manager (big), his two sons and all the equity investors. This means that most of the equity managers are also involved in governing the business. There are also equity investors not involved with the operational side of the business.

In total there are nine dairy farms milking 8,000 to 9,000 cows, six dry stock farms and the machinery importing business. The dry stock farms are in close proximity to the various dairy operations. The dairy farms range in size from 650 to 1,000 cows each, with the exception of the 2,000 cow operation.

The machinery importing business is situated in Palmerston North. This enterprise sells machinery and undertakes agricultural contracting, including cropping, making supplements and farm development, on properties within the business. The enterprise does very little contracting outside of the farming business now, compared to previous years.

The business is currently in the beginning of a new ten year plan regarding its structure.

The mission of the farming business is:

“To create an environment that extends the potential of Family and Investors. Focusing on Dairy Farming, ensuring that those opportunities are there for future generations.”

This is based on “People, Profit and Growth” and the manager believes you cannot take any one of them out of the equation if you want to succeed.

Discussion

The way scale alters the role of the manager and their information requirements was identified in the case studies. Management information systems altered, but core principles remained the same for each business.

Role of the manager and scale

Each manager had his own view of good management. For manager (small) part of management is about eliminating risk. The manager (big) was taught at directors' school that management is about learning to make a profit and to create wealth, and he considers people to be an important part of this. This reinforces the view of Daft (2005) who identifies that it is important for a manager to recognize the role and importance of others and that the only way of getting anything done is through people.

Both case studies had mission statements that addressed the financial aspects of the business and its investors. Each mission statement also addressed specific aspects relative to that business. The key aspect for case study one was to have a simple and attractive operation. A reason for this is that when the system was more intensive, apart from working extra hours, the financial return per hour of work was no greater than when less intensive. This reinforces Davey and Nettle (1997, cited in Doonan 2001) and Doonan's (1995, cited in Doonan 2001) work regarding dairy farmers who expanded their business who found that while income increased so to did costs. The additional expenditure in capital resulted in insignificant social and economic gains.

The mission statement of case study two included the aim of ensuring the operation continued for future generations. In the past this was achieved by increasing the size of the business to utilise existing resources. At present the business is reviewing its management structure to ensure that there are policies, procedures, management structures and job titles in place to ensure that it continues operating should the manager (big) or anybody leave the business. These missions influenced the role of each manager.

Both case studies had plans to achieve their missions. In case study one the manager (small) has eleven key success factors that he uses to help him run a successful dairy farm. The manager (big) of case study two monitors debt to equity, the financial position and cash flow of each operation to ensure that the business is running smoothly and can grow sustainably.

There are three levels of management; strategic, tactical and operational (Shadbolt and Bywater 2005; McLeod and Schell 2001). Manager (small) conducts management at all three levels. Having a sharemilker has reduced the number of tasks he conducts at the operational and tactical levels, for example, he no longer milks the cows and is not heavily involved in feed budgeting, which means that some key success factors are now delegated to the sharemilker. Other tactical activities have remained the same, with continual discussion with the sharemilker on certain issues, for example, drying off date. Strategic management is the sole responsibility of the manager (small), for example, leasing additional land, herd breeding and genetics. The results identify that as the business has grown the core activities remain the same, but the time required to complete each task has increased. For example, cutting balage for 340 cows requires more time on the tractor than for 180 cows.

Unlike case study one, which maintains one dairy farm, case study two has expanded with multiple farms. The manager (big) has moved away from the daily operations of managing the cows to

focus more of the strategic direction of the business, managing growth, development and ensuring the operation runs smoothly. At the tactical level the manager (big) is still involved in annual budgets, the monitoring of monthly production and expenditure, and appropriate decision making. As the business has grown management tasks at the strategic level have increased, for example, managing equity invested by other people, rather than just family equity.

For the manager (big) to be able to focus on the business strategy, different management structures have been installed, identifying people's roles, policies, procedures and a clear line of command for tactical and operational management. The manager (big) ensures staff are doing what is required by the results generated. For example, achieving milk production levels, ensuring expenditure is kept within budget, etc. The manager (big) is a 'results man' and states, 'it doesn't matter how much you talk or not it is the results that count'. Since the manager (big) has been involved in milking cows and running on farm operations he knows what to expect in a drought, flood, good or bad season, and therefore does not have unrealistic expectations and judgements. The manager (big) is a good communicator and understands people management.

Physical time is a key factor in both case studies. Case study two requires the manager (big) to employ people to carry out the operation of milking 8,000 to 9,000 cows. In case study one the level of activities at each of the management levels is less. The manager (small) has time to do strategic, tactical and some operational management. This is shown in Figure 1, adopted from McLeod and Schell (2001), where the size of the triangles are indicative of the quantum of activities carried out.

Manager (small) works at all management levels within the triangle, with the exception of production decisions. Many operational and tactical activities are undertaken by the sharemilker. He milks the cows and has some input into the information system at the operational and tactical levels. The accountant has a large input into maintaining financial records at most of the operational and some of the tactical levels. The triangle representing activities for manager (big) has increased in overall size, with more people being required to fill the functions that the manager (big) has not the time to do himself. Other people do the operational tasks and the majority of the tactical activities. There is also support from experts, for example, the farm advisor. The role of the manager alters as the scale of the business increases, though the key principles of management are the same. All managers perform various interpersonal, informational and decision making roles as identified by Inkson and Kolb (1998), McLeod and Schell (2001) and Daft (2005).

The manager (small) is accountable only to himself and family. The manager (big) is accountable to himself, family, and also the equity investors. Both managers can exit their businesses at any time.

Both case studies indicated difficulties with recruiting and retaining quality staff. Manager (small) overcame this by developing a remuneration package that best suited the worker. In this case the lower order sharemilking agreement proved the best, combined with a simple farm set up, ongoing support, and the ability for the sharemilker to operate individually. The arrangement provides flexibility and control for the manager (small) as he still owns the cows and can dismiss the sharemilker at the end of the season. Case study two found the 50 percent sharemilking contract restricted business development, hence equity partnerships were developed. For case study two the equity partners enable leverage in both equity funds and management (human resource). The manager (big) likes to ensure people can grow within the business in skills and wealth. Staff are offered the opportunity to invest equity and family are given the opportunity to control part of the operation. When working with family the manager believes that it is important for the business to be large enough for each individual to be able to run a section him or herself.

Downey and Erickson (1987) identify in the management wheel shown in Figure 2 that communication aids the planning, directing, control, coordinating and organising, which in turn helps the goals, objectives and results to be achieved. Clear communication is required (The Dairyman 2005). In both case studies communication is an important aspect of management. Each enterprise has formal and informal types of communication, with the formal consisting of meetings and the informal being general conversations with people. An important aspect of manager (big) is his continuous networking between people and ensuring that there is consensus when entering business deals. The manager (small) ensures that both he and his sharemilker are fully informed.

Information and scale

In this section the information collected, and why, by the managers of different scale dairy farming businesses is discussed. For managers to perform their role, Soliman and Youssef (2003) stress that information is crucial. The information collected is influenced by the role of the manager and as identified in each case study the role alters as the scale of the operation changes.

The results identified that both internal and external information is collected by managers in summary and detailed forms. McLeod and Schell (2001) call external information environmental information. In both case studies, internal information was collected on the financial performance of the business. Every second month the manager (small) received a financial report from the accountant detailing income and expenditure for the period. Manager (big) received a monthly report on income and expenditure, which is summarised on one page for each farm with over spending and under production highlighted in a different colour for easy identification. The manager (big) is a 'one pager' who likes the important points on the first page with the detail attached.

The results show that as the scale of the business increases, the role of the manager takes a more strategic focus and the information is presented more in a summary form, which reinforces McLeod and Schell (2001) in Figure 3. Figure 3 shows that as the role of the manager advances from solely operational activities to strategic activities a greater volume of summary information is required, as identified in case study two.

As manager (small) is involved in all three levels of management, detailed information is used. This is in contrast to manager (big) who receives summary information regarding the tasks that he is not directly involved with. For example the manager (small) is involved in farm repairs and maintenance, and receives detailed financial information on this topic. Manager (big) gets a summary of repairs and maintenance for each farm but not specific detail of all repairs and maintenance undertaken, unless requested.

Both financial reports show the budgeted figures for the year and previous year's results to enable comparisons to be made. Comparing output against a predetermined standard or target is called control (Blackie and Dent 1979). The information relating to variations between outputs and the standards or targets is called feedback, which can be used to alter inputs and achieve desired outcomes (Blackie and Dent 1979; Stair and Reynolds 2001). Manager (small) can see if he is under or over spending and if he needs to cut back. For manager (big) the budgets set the benchmark for the year's spending by the farm/equity manager, i.e. this is delegation by authority. The comparison enables the manager (big) to monitor the farm/equity manager's progress, how they are implementing the year's management plan, and question any over/under spending or production. This is delegation by having policies and procedures in place, and having the appropriate information to monitor how operations are going.

In both case studies production information was collected enabling the managers to know business production performance. Like the financial reports, as the scale of the business increases the information presentation takes more of a summary form. Manager (small) views the production of the herd regularly, whether it is from viewing the milk in the vat and/or receiving the Fonterra (milk company) milk statements and using the internet. Manager (big) views production for each farm on a monthly basis. Per hectare production information is shown for all farms on one page in the form of a coloured line graph. The specific details on each farm are also attached. In each case study these results are presented against budget to enable comparisons to be made, questions to be asked and future management decisions to be implemented.

Each business collects information on herd records, supplement levels, animal health, and farm performance, etc, but as the scale of the business increases the role of the manager alters their requirements for such information. For example, the role of the manager (small) involves using information regarding herd records, animal health, etc. The manager (big) does not require such detailed information, instead he receives a monthly report detailing farm operations.

The manager (big) collects information on the position of the company and each year assets and liabilities are valued. That is, land is valued, to enable the level of equity in the business to be calculated and share prices worked out for each operation. This information gives indications as to whether the business can afford to expand. Adeoti-Adekeye (1997) identifies that all this information enables the manager to know what is going on in their businesses so that they can conduct their role more effectively and efficiently. That is, they work on their business but receive information from within.

In addition to receiving information from internal sources, each manager also receives it from external sources. That is, information on what is going on outside the farm gate. Both case study managers collect information on milk prices, animal health issues throughout the country, any political issues, general business activities and financial issues, for example, exchange rates, interest rates, etc. They both collect information on possible business opportunities, farm developments and capital expenditure. While a lot of the information collected is common, it varies in substance. For example, information on farm development for case study one could involve pasture renewal, while for case study two it could involve converting a sheep farm to dairying. The manager (big) is also continually gathering information on accounting and legal issues, and property sales and purchases.

As the scale of the operation increases the quantity of information on each external topic increases. McLeod and Schell (2001) illustrate this in Figure 4. As the manager moves away from the operational activities to becoming more focused on strategic activities, there is more information collected from external sources than from within the business. In both case studies the managers were continuously scanning the external environment for opportunities and ways to improve the business. This was particularly the situation in case study two.

In addition to receiving information, both managers send information to others. The manager (small) provides the coded bank statements to the accountant; gives the annual accounts to the bank manager; and gives any other relevant information about how the operation is going, as well as reports to the sharemilker. The manager (big) reports information concerning relevant issues to his accountant, lawyer, banker, farm advisor, and land agent. The manager (big) also reports to the two supervising farm managers below him, keeping them informed of current issues, as well as reporting to the equity investors.

Management information systems and scale

To collect the required information and help facilitate the role of the manager each farming business has a series of systems and procedures in place.

The two case studies highlight there are two components that make up a management information system. They are formal and informal (Fulweiler 2001; Boehlje and Eidman 1984). The formal systems are made up of the formal meetings and information recording and processing systems. The informal systems are the general communication and sourcing of information. Both formal and informal systems are crucial to the operation of the farming businesses and to allowing each manager to carry out their role.

Firstly, the formal systems will be discussed. Each case study conducts meetings. These meetings are a form of communication, which allows the manager to gather, discuss and disperse information with those at the meetings. These in turn filter the information to other departments, if applicable. In case study one weekly meetings are held between the manager (small) and sharemilker to discuss current issues on the property and anything ahead. For example the application of nitrogen, when to dry off, the number of cows to carry on the farm through winter, etc. Board meetings are held monthly for case study two for each farm, where the financial and production results and farm reports are explained and discussed, as well as any other general issues.

To record information and generate reports, all operations have processes and procedures in place, with the majority of these processes involving computers with some manual processes. This is consistent with findings to Chaffey and Wood (2005), and with Lewis (1998) who identify that both computerised and manual systems are used.

Case study one uses both computer and manual systems. Bank statements are coded and sent to the accountant who compiles the tax accounts and monthly reports for the manager (small). Information on production results, milk tests, etc can be viewed by going to the dairy shed, reading milk statements and/or using the Fencepost website. Herd records are recorded in a notebook and then transferred to the computer system MINDA.

Case study two uses the computer systems Cash Manager to maintain financial records and IMS to manage human resources. Banking is done over the Internet. The one page financial report is compiled by entering information from Cash Manager into excel. The same is done for the production report with information sourced from Fencepost. The farm advisor visits each farm and then compiles the monthly report detailing farm operations (the farm report).

The management information systems for both case studies have developed over time as the businesses have grown. This is known as the bottom up approach to systems development (Williams 1997). This supports the findings of Doye *et al* (n.d.) in that record keeping systems develop continuously over time and not straight away.

In the two formal systems, which include the meetings and recording processes in place, the various reports are generated and analysed with feedback given in order to take control and enable the operation to operate successfully (Blackie and Dent 1979; Stair and Reynolds 2001).

The informal part of the system involves a range of functions. Both case studies have informal communication, talking frequently to their staff, managers and sharemilkers. Each case study manager also has specialists to whom they talk, for example, accountants, bankers, etc.

To gather external information each case study manager reads publications. Manager (small) uses the Internet, reads farming magazines, attends field days and talks to experts, such as the accountant, vet and banker. Manager (big) also reads the press, receives publications, listens to the radio as well as talks to his accountant, lawyer, bank manager, land agent and farm advisor.

In general the systems in place for managers to get their required and relevant information (Adeoti-Adekeye 1997) are similar. While computer programs varied, both case studies had some sort of financial and production system, and ways of collecting external information. For both case studies communication between people is very important, formally via meetings or informally. Both case studies were satisfied with their management information systems but were aware that there are always new developments and room for improvements.

Conclusion

The research focused on management, information and systems for two dairy farming businesses of different scale.

As scale increased, even though each manager had common functions they performed that were specific to their system, the role of the manager differed, becoming more specialized with more scale. Case study one manager (small) performed functions from practical farming through to managing the direction of the business. The manager (big) of case study two focused more on ensuring monthly on farm performance was monitored and accounted for as well as conducting the strategic direction of the business.

Information required by each manager altered with scale but the core business requirements remained the same. Each manager required information on financial and production issues, but as scale increased core information was presented in summary form to allow for timely decision making. Increasing scale of business required a greater volume of information to be processed, hence a management information system with capacity, capability and clarity.

Both businesses had policies and procedures for recording, analysing and presenting information to relevant and specific people. The business systems in place for each case study had the common components of finance and production, with the larger scale case study also requiring a human resource system. Each case study had systems to record physical information. Each case study manager had methods of collecting information on the external environment. As the volume of information increased the specifics of the systems in place for each case study altered to provide the required support for people at all levels of the business structure.

Case study two is an operation that has successfully expanded over time. Processes and protocols implemented by the manager have achieved clear lines of delegation and communication for all involved enabling economies of scale. As businesses grow it is important to have systems in place that have capacity to provide the appropriate support and to ensure that activities are being done well as if the operation was still a one person unit.

Aside from the role of the manager, their information requirements and the types of management information systems in place, the research on these two different case studies of varying scale has also identified that even though the core principles of the operations are similar, it is the individual passions, personal goals and character of people that are the drivers of successful businesses. They give the business its own culture and identity.

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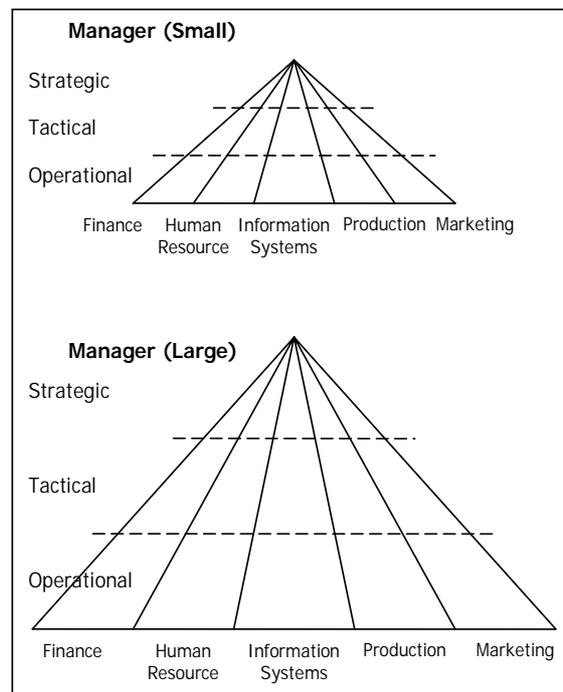
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Appendix

Table 1. Summary of the key characteristics for case studies one and two

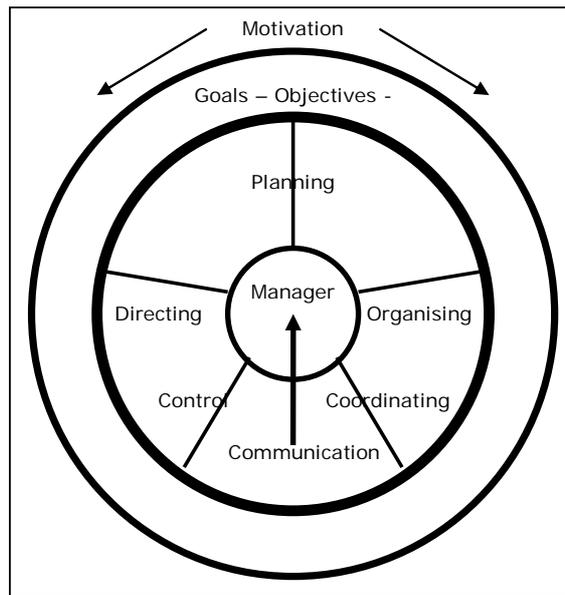
Case study one	Case study two
Owner (Manager (small)) and lower order sharemilker	Part owner (Manager (big)) and 50 staff below (investors, equity/farm managers, farm/office staff, machinery staff)
340 cows	8,000 to 9,000 cows
122 ha milking platform 23 ha runoff	9 dairy farms, 6 dry stock farms Machinery/Contracting business
Land is owned and leased	Land is owned and leased
<p><u>Mission</u> For the operation to be efficient and effective, yet simple and uncomplicated, to be attractive to those working in it and provide the ability to enjoy family and recreational activities.</p>	<p><u>Mission</u> To create an environment that extends the potential of family and investors. Focusing on dairy farming, ensuring that those opportunities are there for future generations. Based on People, Profit and Growth</p>

Figure 1. Management levels



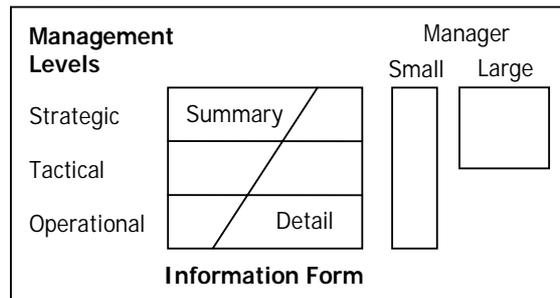
Source: Adapted from McLeod and Schell 2001

Figure 2. The management wheel



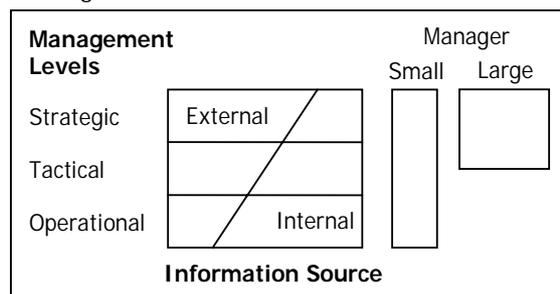
Source: Downey and Erickson 1987 p. 27

Figure 3. Influence on information form



Source: Adapted from McLeod and Schell 2001

Figure 4. Influence on information sources



Source: Adapted from McLeod and Schell 2001

