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SID 5 Research Project Final Report

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Project identification

1. Defra Project code: OFO344

2. Project title: Organic Produce Value Chain Analysis

3. Contractor organisation(s):
   Food Process Innovation Unit
   Cardiff University
   Colum Drive
   Cardiff
   CF10 3EU

4. Total Defra project costs: £ 100,994

5. Project: start date ..... 01 March 2004

   end date ..... 31 December 2005

6. It is Defra's intention to publish this form.
Please confirm your agreement to do so.....**YES** ☒ **NO** ☐

(a) When preparing SID 5s contractors should bear in mind that Defra intends that they be made public. They should be written in a clear and concise manner and represent a full account of the research project which someone not closely associated with the project can follow.

Defra recognises that in a small minority of cases there may be information, such as intellectual property or commercially confidential data, used in or generated by the research project, which should not be disclosed. In these cases, such information should be detailed in a separate annex (not to be published) so that the SID 5 can be placed in the public domain. Where it is impossible to complete the Final Report without including references to any sensitive or confidential data, the information should be included and section (b) completed. NB: only in exceptional circumstances will Defra expect contractors to give a "No" answer.

In all cases, reasons for withholding information must be fully in line with exemptions under the Environmental Information Regulations or the Freedom of Information Act 2000.

(b) If you have answered NO, please explain why the Final report should not be released into public domain

Executive Summary

7. The executive summary must not exceed 2 sides in total of A4 and should be understandable to the intelligent non-scientist. It should cover the main objectives, methods and findings of the research, together with any other significant events and options for new work.

Growth in the Organic food market has been rapid in recent years. According to the soil association, retail sales of organic food are now worth £1.2 billion – an 11% increase on the previous year. Organic Supply Chains have developed to serve different routes to the consumer. Some chains are simple and involve direct supply to the consumer through, for example, box schemes and farmer's markets. However in the main greater complexity is involved. Some 75% of organic food is sold through the multiple retailers. Generally speaking, this introduces more stages into the supply chain and as a result there is more complexity.

All organic businesses have to be profitable and this requires them to operate efficiently. The Food Chain Centre has undertaken three projects dealing with organic producers supplying through multiple retailers. The projects applied the concept of 'lean thinking' and 'value chain analysis'. The projects were led by the Food Process Innovation Unit, which is part of Cardiff University's Lean Enterprise Research Centre. The Lean Enterprise Research Centre enjoys a global reputation in the application of lean thinking and their work demonstrates that businesses can use the concept to secure long term competitive advantage.

Lean thinking provides a way to do more and more with less and less – less human effort, less equipment, less time, and less space – while coming closer and closer to providing consumers with exactly what they want. In other words, the project focused on removing waste from supply chains and focusing on customer value. This is an established approach based on practices first developed in the Japanese motor industry. Lean thinking has become widespread in UK manufacturing and according to a recent survey by McKinsey it is what sets apart the best performing manufacturers.

Many companies that have embraced lean thinking have delivered dramatic improvements over a three year period including:

- 90% reduction in defects
- 90& reduction in response time to customer orders
- 75% reduction in inventory
- 50% reduction in space
- 50% reduction in variable costs

Organic production has some unique features that challenge the lean approach. These include:

- The ethical underpinning for many businesses involved in organic production
- The highly regulated nature of production that prohibits many practices prevalent in conventional food production
- The small scale nature of a substantial part of organic production
- The environmental factor – in that organic farming also makes a major contribution to higher levels of bio-diversity and lower levels of pollution

The Cardiff team are not typical consultants, neither are they experts in organic production. They are expert facilitators, guiding teams drawn from businesses and helping them to see their supply chains in new light. Each project starts from a recognisable product that consumers purchase. The three projects deal with organic carrots, potatoes and lamb. In each case more than one business is involved in getting the product to market. The project constructed a team with members drawn from each business within the supply chain and support from Cardiff University facilitators to draw a 'process map' of the current state of affairs, making sure to capture what is actually happening ('warts and all') and not what is supposed to happen. The Cardiff team then helped each project team to investigate issues such as:

- Do products flow through the chain as quickly as possible or are there unnecessary hold-ups?
- Do some activities add more costs than value? In which case what can be done about it? In particular, are there activities that add absolutely no value to the consumer that can just be eliminated?
- Have people learned to live with errors, treating them as inevitable or are they constantly striving to eliminate them?
- Are the right quality tests in the right place in the chain and are they working effectively?
- Are the right performance measures in place?
- When problems are identified, are they traced to their source and dealt with?
- Is the right information shared along the chain?
- Are there effective ordering and stock holding policies that impose heavy costs on suppliers?

The team then created a second map of how they would like the chain to operate in the future. Finally, they draw up an action plan of how to work in partnership to get there. The projects discovered that there were substantial opportunities to transform the profitability of business within the supply chain, whilst maintaining or improving customer value. These improvement opportunities include:

- Re-designing the layout of factory and farm
- Creating supply chain teams to focus on reducing faults at particular stages of the supply chain
- Forums for customers and suppliers to work jointly on improvement projects
- Agreeing to exchange information that is currently unavailable in a practical format
- Collecting new performance measures and sharing these more widely
- Making better use of Information Technology to share information
- Working in partnership, to increase long term commitment to supply chain objectives

Project Report to Defra

8. As a guide this report should be no longer than 20 sides of A4. This report is to provide Defra with details of the outputs of the research project for internal purposes; to meet the terms of the contract; and to allow Defra to publish details of the outputs to meet Environmental Information Regulation or Freedom of Information obligations. This short report to Defra does not preclude contractors from also seeking to publish a full, formal scientific report/paper in an appropriate scientific or other journal/publication. Indeed, Defra actively encourages such publications as part of the contract terms. The report to Defra should include:
   - the scientific objectives as set out in the contract;
   - the extent to which the objectives set out in the contract have been met;
   - details of methods used and the results obtained, including statistical analysis (if appropriate);
   - a discussion of the results and their reliability;
   - the main implications of the findings;
   - possible future work; and
   - any action resulting from the research (e.g. IP, Knowledge Transfer).

Food Chain CentreCutting Costs – Adding Value in Organics

Project Report to DEFRA

Introduction and Scientific Objectives

Growth in the organic food market has been rapid in recent years. According to the Soil Association, retail sales of organic food in the UK are worth £1.2 billion. Organic supply chains have developed to serve different routes to the consumer. Some supply chains are simple and involve direct supply to the consumer through, for example, box schemes and farmers markets.

However in the main greater complexity is involved. Some 75% of organic food is sold through the multiple retailers. Generally speaking, this introduces more stages into the supply chain. Growing, processing and distributing product to the consumer is therefore a complex process involving several legally discreet organisations. Working with whole chains to develop a cooperative approach to process improvement in other industries and other agricultural sectors has resulted in higher supply chain performance including increases in quality and availability, reductions in cost and an increase in chain profitability and competitive advantage.

As up to 70% of organic produce consumed in the UK is imported, increasing the competitive advantage of UK organic produce supply chains will benefit the organisations within those chains, protect and possibly extend the area of land under organic production in the UK and reduce the food miles caused by UK organic produce consumption.

The Food Chain Centre (FCC) has undertaken 3 research projects dealing with organic producers supplying the consumer through the multiple retailers. The research was conducted by the Food Process Innovation Unit (FPIU) of Cardiff University. The FPIU have extensive value chain analysis experience in retail supply chains including the red meat, dairy, arable and produce sectors. The three research projects focused on:

- Organic Carrots
- Organic Potatoes
- Organic Lamb

The scientific objectives of the three research projects were to:

- Identify participant Supply Chains
- Complete industry structure maps
- Conclude contractual relationships which governed benefits sharing protocols
- Identify the Value Chain product and boundaries
- Complete the Current State Map of the Value Chain
- Complete Company Process Maps
- Identify Customer Value
- Identify Supply Chain Key Performance Indicators linked to Customer Value
- Develop Supply Chain Ideal State Map
- Create Supply Chain Future State Map, deliverable within 12 months
- Identify, agree and assign key projects to deliver the future state

In addition to the specific scientific objectives given above, it was the intention of the FCC to use the information gathered to publish a case study which would assist the wider organic producer community to improve the performance of their own supply chains.

Realisation of Scientific Objectives

The three case studies were completed by June 2005. In all cases the cooperation and commitment of the organisations involved enabled the research team to realise the scientific objectives of the project.

Much of the detailed documents produced by the research team are documents which are covered by commitments made by Cardiff University to respect the commercial confidentiality of the participating organizations.

However the participating organisations have given permission for the publication of the two most significant research documents, the Current and Future state maps. These documents for each of the three case study supply chains are included in the following section of this document.

Research Background and Methods

The term 'lean' was first used by James Womack, Daniel Jones and Daniel Roos in *The Machine that changed the World* (Womack et al, 1990). Lean production is rooted in the Toyota Production System which turned "Toyota Motor Corporation" from a small domestic supplier in the 1950's into the world's leading automotive company in the 1980's. The fundamental tenet of lean production is the elimination of waste (*Muda*). Muda is defined as any human activity which absorbs cost but creates no value. Performing a wasteful activity adds no value but incurs cost. This insight creates a vision of eliminating waste both within the firm and across the value chain (Womack and Jones, 1996).

Ohno (1998) identifies seven types of Muda: waste from overproduction; waste from waiting inventories; waste from unnecessary transport; waste from waiting times; waste from unnecessary motion (movement of people); waste from unnecessary processes and waste from defected products.

The first principle of lean production is identifying value from the final customer's perspective, which entails understanding the specific requirements of particular consumers. The next principle, involves the identification and mapping of the value stream – the route from the production of raw materials to their ultimate consumption. Once the value stream is mapped, non-value adding process steps become apparent. The third principle is to get the single product to flow continuously through value adding process steps. This requires the elimination of barriers to flow. The fourth principle is to allow products to flow at the pull of the customer. This implies that nothing is produced upstream until someone downstream needs it. The last principle of lean production is pursuing perfection continuously. This means that organisations should constantly seek to identify and eliminate waste in their production and management systems.

Lean thinking has become established in UK and World manufacturing. Many of the organisations that have embraced lean thinking have delivered dramatic improvements; including reductions in defects and response times to consumers, lower inventories, cost reductions and reductions in space requirements of organisations.

The FPIU, is part of the Lean Enterprise Research Centre (LERC) at Cardiff Business School. LERC are world renowned in the application of lean thinking and their work demonstrates that businesses can definitely use lean thinking to improve their competitive position.

Lean thinking may benefit manufacturing and has also been successfully applied to other sectors including construction, healthcare and raw materials. The research project intended to identify whether lean thinking could make a contribution to the organic sector. Organic production ha some unique features which might be thought to challenge prevailing lean concepts. These include:

- The ethical underpinning for many businesses involved in organic production.
- The highly regulated nature of production that prohibits many practices prevalent in conventional food production.
- The small scale nature of a substantial part of organic production.
- The environmental factor – in that organic farming also makes a major contribution to higher levels of bio-diversity and lower levels of pollution.

Each research project case study begins from a recognizable product that consumers purchase. The three case studies deal with organic carrots, potatoes and lamb. In each case more than one business is involved in bringing the product to market. Each case study team was drawn from each business within the particular supply chain with the support of a FPIU facilitator. The overriding purpose of the team is to create a current state process map of the entire supply chain. The chart describes what is happening, not what should be happening and results from direct observation.

The process maps present key information on the operation of the supply chain, including; the flow of physical goods, the flow of information, defects / loss rates, value adding time and total elapsed time.

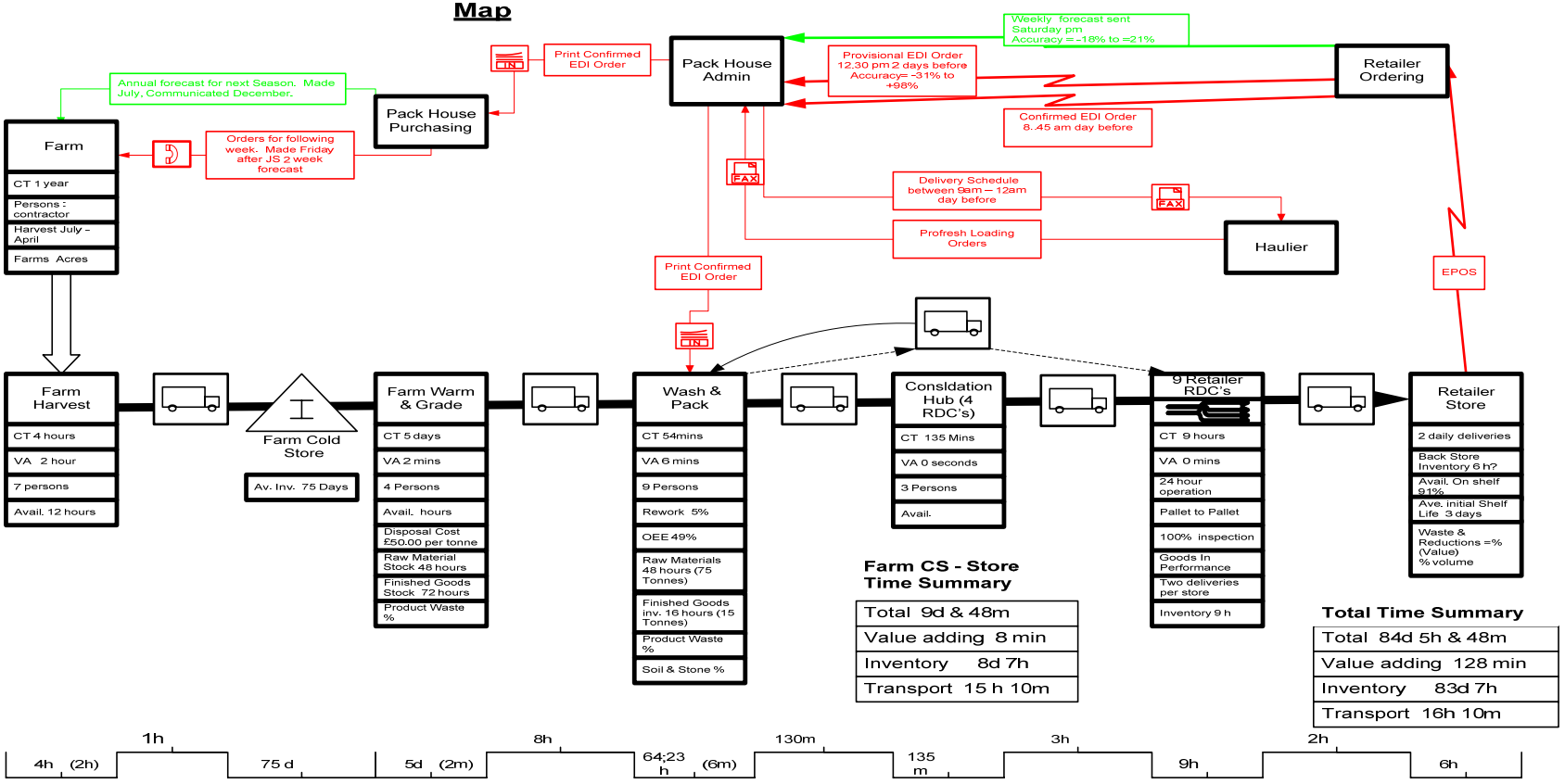
Armed with this information, the FPIU facilitator then assist each research team to investigate opportunities, and create a second, Future State process map, which describes how the supply chain should operate in future. Finally, the team draws up an action plan of how to work in collaboration to realise the opportunities identified.

Research Results

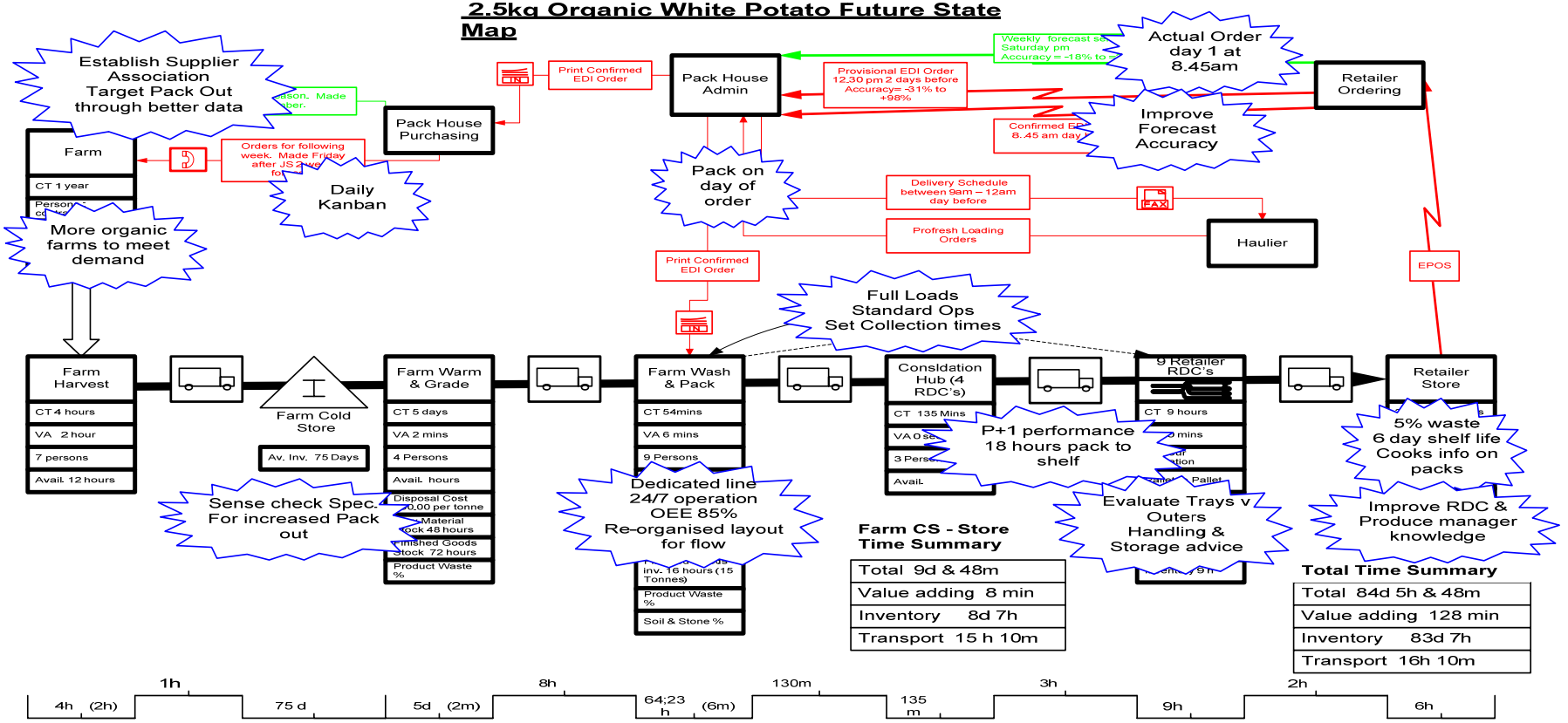
The following process maps are given as the project's research results. The process of creating the maps begins with the selection of a key product on which to concentrate analysis. The research team then attaches themselves to the product and 'walks' the whole chain from the field to the supermarket shelf. Detailed information about each stage of the supply chain is compiled to create the value chain maps. The mapping team identifies:

- The physical movement and flow of product
- The information flow, particularly orders and the demand signal flowing up the supply chain
- Issues and opportunities to improve processes at each stage

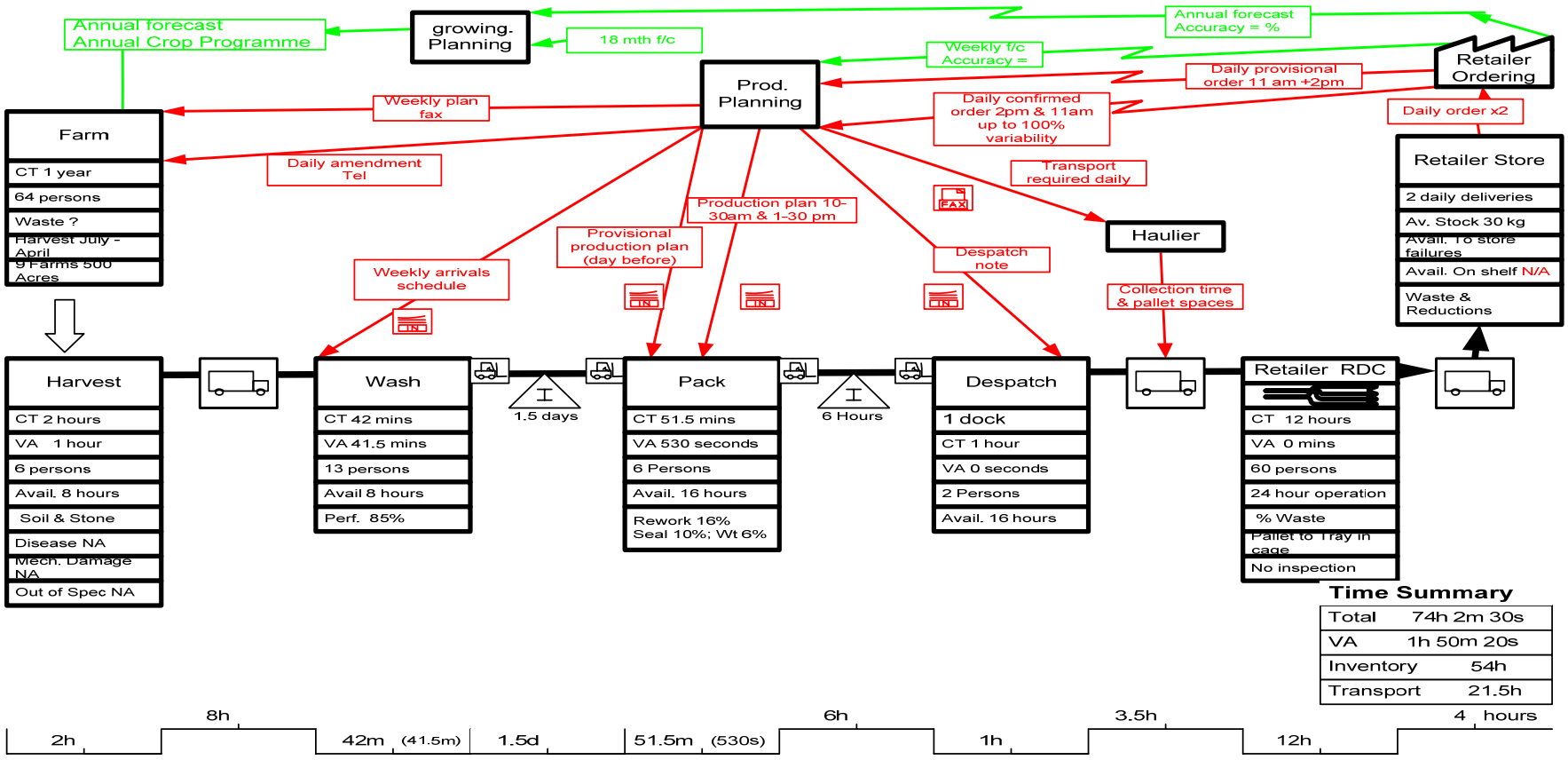
2.5kg Organic White Potato Current State Map

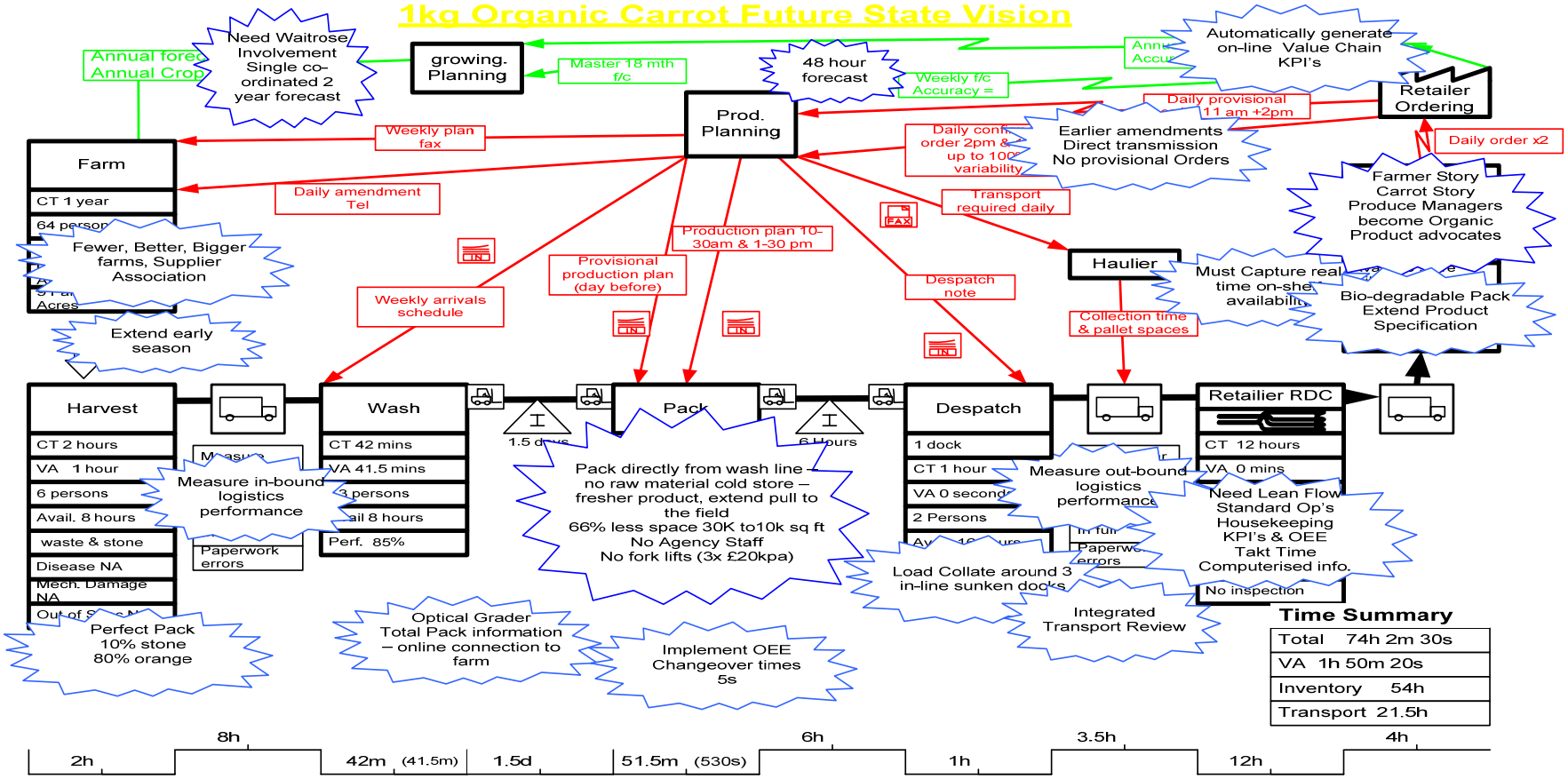


2.5kg Organic White Potato Future State Map



1kg Organic Carrot Current State Map




1kg Organic Carrot Future State Vision
Need Waitrose Involvement Single co-ordinated 2 year forecast
growing. Planning
Master 18 mth f/c
48 hour forecast
Weekly f/c Accuracy =
Automatically generate on-line Value Chain KPI's
Retailer Ordering
Daily provisional 11 am +2pm
Daily order x2
Prod. Planning
Weekly plan fax
Daily amendment Tel
Earlier amendments Direct transmission No provisional Orders
Farmer Story Carrot Story Produce Managers become Organic Product advocates
Bio-degradable Pack Extend Product Specification
Transport required daily
Production plan 10-30am & 1-30 pm
Provisional production plan (day before)
Weekly arrivals schedule
Despatch note
Collection time & pallet spaces
Haulier
Must Capture real time on-shelf availability
Farm
CT 1 year
Fewer, Better, Bigger farms, Supplier Association
Extend early season
Harvest
CT 2 hours
VA 1 hour
6 persons
Avail. 8 hours
waste & stone
Disease NA
Mech. Damage NA
Measure in-bound logistics performance
Paperwork errors
Perfect Pack 10% stone 80% orange
Wash
CT 42 mins
VA 41.5 mins
Perf. 85%
Optical Grader Total Pack information – online connection to farm
Pack
1.5 days
6 Hours
Pack directly from wash line – no raw material cold store – fresher product, extend pull to the field
66% less space 30K to10k sq ft
No Agency Staff
No fork lifts (3x £20kpa)
Implement OEE Changeover times 5s
Despatch
1 dock
CT 1 hour
VA 0 seconds
2 Persons
Load Collate around 3 in-line sunken docks
Measure out-bound logistics performance
Integrated Transport Review
Retailier RDC
CT 12 hours
VA 0 mins
No inspection
Need Lean Flow Standard Op's Housekeeping KPI's & OEE Takt Time Computerised info.
Time Summary
Total 74h 2m 30s
VA 1h 50m 20s
Inventory 54h
Transport 21.5h
2h
8h
42m (41.5m)
1.5d
51.5m (530s)
6h
1h
3.5h
12h
4h

Discussion of Results

Organic Carrots

Only 59% of organic vegetables sold in the UK are grown in the UK (source:HDRA 2005). Demand is rising faster than supply and whilst organic products command a higher price in the market, costs of production and competition from abroad mean that profit margins at all stages of the organic chain are under pressure.

By working together with its suppliers and customers, RB Organics have been able to identify improvements that will lift profitability for all parts of their supply chain. The Value Chain Analysis project allowed the supply chain to unlock the potential for cutting costs and increasing profitability.

The project identified that 40% of all carrots harvested are not packed for the consumer – instead they end up as animal feed or are sold for processing. This is particularly significant as profitability in the supply chain (especially at the farm and pack house) is determined to a large extent by carrots that are packed and sold as Class 1 product. The research project identified the breakdown in carrot production and use:

% Waste in Organic Carrot Production

Class 1 product	60%	Packed for Waitrose
Oversize	5%	Sold for processing
Major Mis-Shapes	8%	Sold for processing
Minor Mechanical Damage	1%	Sold for processing
Pests & Diseases	16%	Animal feed
Undersize	6%	Animal feed

If the amount of product that ended up on the supermarket shelf – the 'pack-out' rate – was increased by five percentage points, the budgeted farm profit would increase by 60%.

As a result of the research project a series of steps that will improve organic carrot production have been agreed across the supply chain. The improvement opportunities identified by the research were too numerous to be implemented simultaneously. The project team therefore produced an action plan with prioritized actions, clear statements of benefit together with resources required for implementation. Examples of the key initiatives agreed are recorded below:

- creation of an RB Organics Carrot Growers Club

  There is considerable variation in the pack-out rate achieved by RB growers. By establishing an organic growers club, improvements will be realized by analysing and addressing the rot causes of mechanical damage, disease, and picking stone and soil rather than carrots. The club has set itself a medium term target of achieving a 70% pack out rate across the group. If this target were achieved budgeted farm profit would more than double.

- provision of comprehensive, real time quality information to growers on every delivery to RB Organics

  The provision of better information on quality for each and every delivery to RB Organics will help growers and the whole chain to gain competitive advantage through better produce and a greater pack-out rate. RB Organics will provide club members online access to the data from their optical grader. This 'real time' flow of information will help growers understand why some fields or some picking operations are performing better than others.

- a new approach to strategic planning led by Waitrose and RB Organics and more accurate order forecasting to identify future land requirements and align supply more closely to consumer demand

  At present both Waitrose and RB Organics forecast future requirements independently. Often there is a mismatch between supply and demand as a result. More accurate order forecasting, both over the planting and growing period and for meeting immediate consumer demand, is paramount. Through co-operation between Waitrose and RB Organics future land requirements will be planned to help reduce under or over production.

  More accurate order forecasting will also help bring carrot harvesting in line with consumer demand. To deliver this, Waitrose will replace the inaccurate provisional EDI order which at present is not relied on by RB Organics.

- a re-design of the RB Organics pack-house to help produce flow more smoothly and reduce unnecessary stock, cold storage and handling

  The research project identified significant opportunities to improve flow at the RB Pack-house. By a redesign to the pack-house, inventory storage time will be reduced from37 to 19 hours. Space requirements will be reduced from 30,000 to 10,000 square feet, and harvest-to-shelf lead time from 68 to 50 hours. The need for agency staff in the pack-house will be removed.

- the creation of a set of whole chain performance measures and a value management team to take on-going responsibility for driving improvement against these measures

  A management team will be established to take responsibility for continuous supply chain improvement. This team will develop a set of key performance indicators and use them to drive improvement. Further work will also be carried out to align value chain management with current category management systems. Waitrose Produce Managers will become 'value chain advocates' to actively promote the idea more generally within the supply chain.

Organic Potatoes

A team comprising potato grower MB Organics, processor Greenvale AP and Sainsbury's mapped the supply chain of organic potatoes. As with organic carrots the research identified that a significant proportion of product (30%) failed to be put on the supermarket shelf.

The research identified that key improvement opportunities existed in:

- Improving the pack-out rate

  As with the organic carrot chain, pack-out rates was a significant determinant of grower and packer profitability. As some 30% of all potatoes harvested are not packed for the customer this represents a major opportunity to increase grower profitability.

  As a result of the research Sainsbury's suggested that they examine their specification and assess whether it could be extended without compromising consumer value. The research indicates that a small extension could have a significant affect on grower and pack house profitability

- Reduce waste and price reductions in store

  The research identified that there were significant levels of unsold product within the stores at the end of the product's shelf life. This waste was reflected in the need to dispose of unsold product, but more usually the practice of reducing the price of the product by significant amounts in order to assure its sale.

  This practice had a significant impact on the profitability of the supply chain. It was also, to an extent, self-perpetuating, as price reductions distorted consumer patterns, and led to unsold stock of similar SKU's, which would have to be marked down on subsequent days.

  In response to the above findings, the research team decided to evaluate the range of products on the shelf and promotions practice in the supermarket whilst reducing the delivery lead time from pack-house to store.

  Both Greenvale AP and Sainsbury's forecast future requirements independently and this can result in a mismatch in supply and demand. The research identified scope to improve the accuracy of short term forecasts and provisional orders, and it was felt that this would have a positive effect in minimizing waste and price reductions in store.

- Increase packing efficiency

  The Greenvale packing plant was already involved in a lean improvement initiative when the research project was initiated. This was primarily aimed at reorganizing the layout of the plant with a view to achieving a flow process in order to minimize waste and non-value adding activities. In particular the project aimed to significantly reduce the movement of product around the plant, which in turn would have an immediate financial pay back by reducing the number of fork lift trucks.

- Develop value chain management capabilities

  The research found that there were no value chain key performance indicators and no one had responsibility for improving the performance of the chain as a whole.

Organic Lamb

The organic lamb research project compared the production of organic lamb with the production of conventional lamb. The research team was comprised of Stuart Hyslop, an organic farmer from Northumberland and James Dobie, a conventional farmer from Berwick. Lamb was processed by Dawn Meat and sold through Marks & Spencer.

These chains were efficient and well run, where collaborative practices had already given rise to best practice levels of performance. Nevertheless, there were opportunities for improvement, including:

- 33% of the organic lamb carcase is sold as conventional product

  The average resources required in the breeding process for organic lamb, including replacements, tups and lamb scan, are 20% higher compared to conventional lamb production. Throughput time is 15% longer, though there is less intervention (worming etc.).

  The research also identified that although organic lamb producers obtain a price premium of between 8 – 12% in the market, not all cuts were sold as organic. All high value product, such as chops, was sold as organic produce. However 33% of the carcase including lower value cuts (shoulders, breast, trim) was sold as conventional product.

- In this research study, the mortality rates of organic lambs are reported as 3% lower than their conventional counterparts. However, this difference may be attributable to the reporting system used by the conventional farmer, who used actual figures which captured all losses, rather than estimates. This highlights the potential benefit of accurate measurement of farm and industry-wide benchmarks of operational performance

  There are a number of methods for measuring mortality, including monitoring from either pregnancy or birth to the farm gate. From pregnancy the research indicated mortality of between 11 to 15% and from birth to farm gate, levels of 8 to 12%. The research team were unable to benchmark these rates against an equivalent national database to assess how well the farmers in the supply chain were performing. The research team conducted interviews with a group of nine farmers outside the study supply chain. Our results indicated that they did not measure mortality in a systematic way. Estimated mortality was in the range of 10 to 15% in line with the supply chain farms.

  In a nine year study conducted in the US with a different methodology, 10 – 14% was reported from birth to farm gate. Although the study method is different, they found significant improvement opportunity. In their view, about 75% of all mortality had its cause in faulty or inadequate management. As such, sheep producers should set a target of between 4 and 5% mortality.

- The reward systems and the required specification are mis-aligned. Small changes to the specification would improve efficiency along the supply chain

  Meeting the target weight also affects returns along the supply chain. From a sample of 1,794 lambs delivered in a week, 82% were of the optimum conformation and fat levels. However, only 67% were in the optimum weight band. The research team believe that producers were holding animals back to wait for a better price, or to maximize the revenue for the lamb. Nevertheless, the primals would be of the correct quality to be processed to meet the retailer's specification. The producers in the chain targeted 16kg against a mid-point of 18.75 set by Dawn Meats.

  The research strongly indicates that there was a mis-match between the reward system that is used to pay farmers and the specification required by the retailer but this has been partly addressed by the contractual arrangement between Dawn Meats and the farmer. Along the chain there was evidence that overweight product made butchery more difficult, had potential to increase fixed weight-pack giveaway and delivered under or over-sized products that require further preparation for retail packs.

- The extreme nature of the terrain that has been converted to organic production means that it can support 25% fewer lambs compared with the conventional production system

- Preventative maintenance on packing lines can provide efficiency benefits

  The research identified that processing operations already operated in line with lean principles illustrating that good farmers practices can bring efficiency gains that others could benefit from.

- Improving levels of retail Waste & Availability represented an opportunity for improving supply chain profitability

  Marks & Spencer pride themselves on delivering good customer service. Poor availability of product on shelf is poor customer service. There is always a trade-off between achieving high levels of availability and avoiding wastage in store through mark-downs or 'giveaways'. This is an area where the study supply chain has a significant opportunity to improve performance.

- Improving provenance with on-pack information could benefit UK producers

  Marks and Spencer have had placed the farmers name and country of origin on the product pack under the heading of 'meet the farmer'. The research team has developed this idea further, placing the farmer's name and county on the packaging. This gives the consumer a greater element of trust in the quality of the product as well as an informed choice to buy lamb from a locality of their choice. The farmers name and county of origin was placed on the organic lamb packaging in April 2005. The results are at present being reviewed.

Implications of the Findings

The research team feels that the research has a number of profound implications for the UK organic sector. These are set out below in the form of the prime opportunity identified and a number of enablers and barriers to realizing that opportunity:

Opportunity to Transform Supply Chain Competitiveness

The authors are convinced that the research demonstrates that collaborative practices underpinned by Lean Thinking could transform the competitiveness and potential profitability of the chains studied, particularly for the farmers and packers. In our view it is not unreasonable to expect that over the medium term (three to five years) profitability could be increased by a factor of two (at a conservative estimate) or three (at an ambitious estimate). Some of the study organisations were producing at break-even or a loss, in which case the opportunity is to move into profitable trading. We must emphasise that this potential increase in profit arises from waste reduction, it is not simply a redistribution of profit within the supply chain

Such an increase in competitiveness would have a significant impact on the sustainable competitive advantage of the UK organic sector and the ability of the UK organic industry to compete with overseas competition in a relatively volatile market. It would also give the UK organic sector the confidence and reason for investing in the future, without which we would expect a long term decline in the competitiveness of the UK organic sector.

Enabler of Opportunity: Farm Scale & Specialisation

The research team feel that increases in effectiveness at the farm demand that farmers maximize their knowledge and take advantage of economies of scale. We feel that the logical extensions of this fact is the necessity of farmers specialising in particular products and farming those products at a level which gives them the opportunity to benefit from economies of scale.

There are a number of business models which are capable of delivering these requirements, including farmer's cooperatives. However the research team does recognize that there may be a tension between the scale and specialization necessary to enable continuous improvement and the perception possibly held by the public that organic products should be grown on small farms using absolutely traditional methods.

Enabler of Opportunity: Understanding Cause & Effect

The research teams felt that there was a farming culture which accepted out of specification product as an unwelcome but inevitable aspect of farming, and particularly of organic farming, where the opportunity for intervention was often diminished.

However the research indicated that significant improvements in pack-out rates and in-specification meat can be achieved if data is collected and steps taken to isolate cause and effect of non-conforming produce.

Whilst we accept that farming is very different to manufacturing, we do believe that there are significant opportunities in farmers taking a more active role in continuously improving rates of 'conforming' product. We also recognize that the retailers must also take an active approach to 'sense checking' specifications, to ensure that they reflect consumer requirements.

Barrier to Opportunity: Trading & Marketing Culture

The research identified that the business culture in the studied supply chains was Trading and Marketing focused. The relative lack of a Process Focus meant that there was little formal measurement or chain wide management of continuous process improvement. The natural response to external commercial pressures appeared to be price reductions, rather than process improvements.

Ultimately, responding to competitive pressures via price reductions leads to unprofitable chains which are unable or unwilling to invest and are therefore progressively unable to provide customer service.

Barrier to Opportunity: Unwillingness / Inability to Invest

The research team believes that the opportunity to transform profitability is contingent on supply chain organisations, particularly growers and packers, investing in their processes. Such an investment will only be made if those organisations believe that:

1. They have a long term future in the Supply Chain
2. They believe that the investment will prove profitable in future, that is future business will be profitable business
3. They are able to access funds for investment, either through earlier successful trading or by being viewed as being creditworthy by the financial institutions

The research team believes that some of the commercial practices prevalent in the UK organic sector threaten the willingness or the ability of growers and packers to invest in the future effectiveness of their processes. Those practices include the threat that organisations will lose contracts unless they accept reduced profit levels and operating on wafer thin profit margins that do not adequately reflect the risk incurred by the business. The consequences of any failure to invest will inevitably be a reduction in the international competitiveness of the UK organic sector.

Possible Future Research

The research team feels that there are two main directions in which future research should lead.

In the first instance, it should be recognized that all three of the case study supply chains used multiple retailers as the producer's channel to market. We feel that this decision was legitimized by the fact that approximately 75% of all organic produce in the United Kingdom is sold through the multiple retailers. However the research team recognizes that it would be desirable to research the opportunity for process improvement in other supply chain models.

In the second instance, the research team feels that longitudinal research in the case study supply chains could potentially make a significant contribution to knowledge. In particular research designed to identify the restraining forces, (and the strength of those restraining forces) on desirable supply chain change, particularly in the area of inter-organisational collaboration could be of significant practical benefit in improving the competitiveness of the UK organic produce sector.

Consequences of Research

The research has had consequences in two regards. Firstly, there have been direct consequences within the specific supply chains where the research was conducted. Secondly, there have been general consequences for organisations in other organic supply chains.

In each of the studied supply chains, the research identified significant opportunities for increasing the sustainable competitive advantage of the organisations involved. In this context we use competitive advantage to signify the ability of the organization to trade profitably in complex and relatively volatile markets as a result of delivering value to the supply chain's consumers.

In almost all cases significant enhancements to competitive advantage require changes in the organization of managerial structures and increased financial investment, particularly at the farm and pack house.

The research has clearly identified that the key enabling factor for the changes necessary for increased competitive advantage is the nature and quality of the commercial relationships between supply chain partners. In particular the stability of supply chain relationships, the willingness and ability of partners to share information necessary for improving supply chain processes and the recognition that profit is a necessary condition for investment is vital if the chains are to improve the level of performance that they achieve.

The findings of the research have been published as a case study by the FCC and are being disseminated and publicised through a number of channels. The authors hope that the dissemination of the research will influence the debate as to what represents best practice in the organic sector and as such will have a tangible impact on the culture and performance of the UK organic produce sector.

References to published material

9. This section should be used to record links (hypertext links where possible) or references to other published material generated by, or relating to this project.

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