Supply Chain Management for Single Desk Sellers

William C Bailey
Lidia V Norina
Professor and Lecturer in Agribusiness
Massey University
Palmerston North, New Zealand

Problem Statement:

Single desk sellers (SDS), such as the Australian Wheat Board (AWB) and the New Zealand Dairy Board, must sell production from their member suppliers while responding to customer needs. Either party – the supplier or the customer - is ignored at the peril of the SDS. SDS recognise the inherent conflict between being customer driven and being supplier driven. One method to diminish this conflict is to reduce risk, and inefficiencies that are a result of that risk, in the supply chain from supplier to consumer. A risk shared is a risk reduced. However, different participants along the supply chain have different risk profiles and different risk management needs. This research investigates if there is an intersection of risks shared by at least one chain member. If so, when those risks are identified, measured and ranked, they may be managed by those businesses sharing the risk. Further, it is suggested that SDS may be an organisation structure that is best suited to manage the supply chain for certain agricultural products.

Objectives:

It is in the opportunities available to improve the supply chain that SDS have a unique advantage over their competitors. They control much of the chain, from the farm to the retailer. SDS have the ability, by establishing strong and enduring commercial relationships, to understand both the needs of their producer members and of their customers. This is a powerful tool. The question is how to take these opportunities and turn them into competitive advantages.

A significant challenge exists for single sellers in the area of risk. A single seller's business is the entire supply chain, not parts of the chain. Single desk sellers are interested in product movement 'inside out' – from the farm to the export location – and 'outside in' – from the port of export to the final destination. Risk is held the entire time that the SDS holds product. Even when the product is sold, single desk seller risk continues. There are the risks of losing customers, of unexpected political events and of changing eating patterns. One way to reduce risk in the supply chain is to make movement through the chain as efficient as possible. Risk may be reduced and chain efficiency improved by application of logistics quantitative techniques. While these techniques are most often used to improve intra-firm efficiencies, application to inter-firm movements provides opportunities for increased efficiency and chain optimisation. Use of such quantitative techniques reflects the view that although improving parts of the chain is important, improvements in the entire chain are possible so that single desk sellers may become more efficient and more competitive.

Supply Chain Management (SCM) is defined as the integration of business processes from end user through original suppliers that provides products, services and information to add value. Integration of activities is the result of the recognition that some inter-firm activities are based on common interests. That is, different firms in the supply chain may have needs for similar outcomes.

There are two main drivers for supply chain management:

1. A belief that efficiency and market competitiveness of all chain participants may be improved by sharing information, including strategic information and joint planning.
2. The SC can be used to eliminate waste and duplicate effort by reducing inventory levels and cycle time.

The above two drivers are based on the assumption that firms often have risks in common with their customers and other members of the supply chain.

Procedures:

In this research, set theory was used to formally describe the risks shared by SC members and customers. The researchers initially viewed each business as a set of business activities. Traditional business relationships may be presented as the intersection of such unions. Shared risks exist if there is not an empty inter- business intersection of activities.

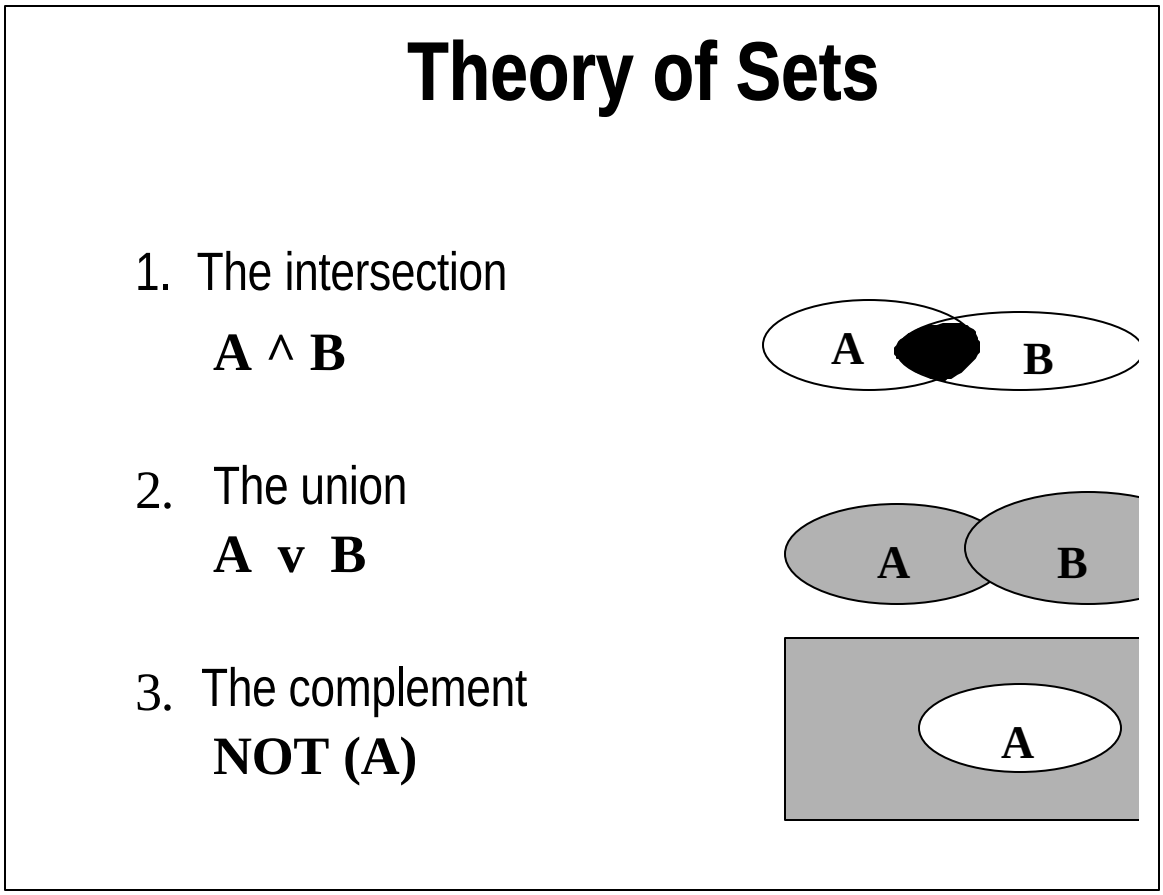
Set theory may be used as a tool to find solutions to the challenges of managing and optimising the agri-food supply chain. The purpose of using set theory is to underscore the importance of knowing what risks business shares with external parties and others in the supply chain and what risks are important only internally.

There are three types of sets of interest to us: Complement, Union and, most important, Intersection (See Figure 1). We will use the Australian Wheat Board to illustrate these types of sets.

Union: The union of two sets A and B results in the formation of a new set. This new set contains all of the elements of both sets. If these two sets are composed of risks faced by two chain members and if the risks of one chain member are shared with another chain member, there is a union of their risks.

There are certain aspects of the wheat industry that are important to all participants in that chain. For example, a positive assessment of the nutritional importance of wheat and wheat products in a healthy diet would increase demand for wheat. This increase would benefit all chain participants: farmers, exporters and millers. A negative assessment of the dietary impact of wheat, conversely, harms all chain participants. With a union of risks, all chain members share the same risks.

Figure 1



Complement: If there is a universal set of all risks faced by all businesses in the supply chain for Australian export wheat, there are some risks that are not shared by certain firms. This means there are some risks that are encountered only by one member of the chain and not others.

There are many activities performed by chain participants that affect only their business and not other businesses in the chain. For example, tillage practices on the farm, promotion policies of the exporter and hiring practices by the miller are all internal risks. Others in the chain do not share these risks. How well the individual business manages those risks and issues is a completely internal issue.

Intersection: The intersection of the two sets is the most interesting intersection for this research. The intersection of Sets A and B forms a new set that is not empty. This Set contains some, but not all, of the elements contained in Sets A and B. If all elements were shared, there would be a union of these sets. But with only a portion of their individual set of risks shared, this is an intersection of a part of the two sets. It is the identification of the elements contained in the intersection that is the challenge, and hence the opportunity, for the Australian Wheat Board.

For example, uniform grades and standards to measure variation in test weight and protein content are important to the exporter and to the miller. Because both parties are affected by any variation, both parties benefit if the risk associated with variation is reduced. However, until the intersection is identified, neither party will recognise that they both may benefit from shared solutions. Through the use of agreed upon grades and standards, uncertainty is reduced and, with that reduction, comes a decrease in risk.

The (AWB) has business risks as do other supply chain members, including the customers. Where do these risks overlap? What are the mutual concerns? Where is the intersection of the risks and interests of the AWB and its customers? The ability to answer such questions moves the AWB a long way down the path toward a well run supply chain and a supply chain that responds well to all situations, including the uncertainty of agricultural production. Any firm that wishes to optimise its supply chain, particularly in the agri-food sector, needs to identify those issues for which it has shared interests with others in the supply chain, that is for which there is an intersection of sets.

Business relationships in the supply chain may be presented as Cartesian products of sets. SCM is often referred to as a business collective philosophy. Consequently, mathematical logic helps to formalise business relationships and SCM philosophy into identifiable goals of risk management.

When it is recognised that some members of the supply chain have an intersection of risks, it then becomes the task of those members to first identify and then to measure and rank those risks. This last step permits the ranking of risks so that those risks that are ranked the highest may first be analysed and attempts made to manage them. In this process, answers are found for questions such as: How much money is involved? What time factors are involved? Who is affected, and how? Who are the decision-makers and what is most important to them? Who will be consulted and what will they counsel? What are the lose/lose, lose/win and win/win opportunities?

In Figure 2 below, following from the discussion of set theory above, Quadrants A and D are complements of the set of risks faced by the AWB and its customers. Quadrant B is the intersection of those risks and this intersection is not empty. Identifying the elements in this Quadrant is the challenge for all businesses attempting to improve the performance of their supply chain.

In Quadrant B, the risks shared by both chain participants may be ranked. The further from the origin a point is located, the greater the risk faced by the business. If the risks furthest from the origin for both chain members are ranked the highest, with the ranking descending as risks approach the origin, both firms may identify and work on those activities that are most important to each firm. If Quadrant B were bisected with a 45-degree angled line, originating at the origin, risks between A and B that lie along that line would be identical. Any shift away from that 45-degree line increases the risk incurred by one firm with no change or a reduction in risk experienced by the other firm.

Figure 2

If risk is measured in financial terms, questions to be answered could include: How do we calculate the total potential profit of offerings? Which of our assets create profitability? Which investments yield highest profits? What information (and which information systems) most increases profit? What does each function and process contribute to profit? What mix of current ingredients yield the highest profit? What new blends of ingredients yield the next highest profits? What is the maximum possible revenue given the resources? What does the channel contribute to profit?

Through the identification, measuring and ranking of formally defined shared risks, supply chain participants may reduce risk levels by avoiding duplication of efforts and increasing system efficiency. Methodologies to measure areas of shared risk are discussed elsewhere at this Symposium (Norina). That shared risks exist and that there exists the need for a methodology to measure and rank those risks is supported by this paper.

Results:

The intersection of risks between participants in the supply chain was formally defined. Further, set theory supported the view that chain participants also share, in varying degree, risks faced by other chain participants. The same concept was applied to sets of Cartesian points. This approach resulted in the determination that while intersections of sets of risk exist for chain participants and that the set is not empty, the challenge is to quantify, measure, rank and manage factors in the intersection. This approach gives a strong foundation to the definition of SCM as a risk management philosophy.

Conclusions:

With the recognition that shared risks exist in the supply chain, there is the possibility that those risks may be managed co-operatively between chain participants. SDS have a unique organisational structure that operates with a nearly seamless chain from producer to customer. Consequently, they are in an excellent position to take advantage of improved management of shared risk along the chain and the resulting increase in chain efficiency. Further research into how to identify, measure and manage those risks is needed.

Reference:

Norina, L, "A Quantitative Approach to Supply Chain Integration", IAMA Food and Agribusiness Symposium, Sydney, June, 2001.