



CREATING SUSTAINABLE AND RESPONSIBLE SUPPLY CHAINS THROUGH HUMAN RESOURCE AND INFORMATION SYSTEM INTEGRATION

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Abstract: The depletion of natural resources and disparity in wealth and development has led to calls for a focus on sustainability in management. Sustainable management can be brought about with an emphasis on the triple bottom line, which refers to adding people and the planet alongside profit as the basis to judge outcomes and guide managerial decision making. Meanwhile, the field of supply chain management has evolved from the realization that demand is satisfied through the cooperation of several firms, not through the actions of a single firm. The revelation of supply chain management is that firms in the same supply chain (partners) should coordinate decisions – rather than making these decisions in an isolated fashion – to increase efficiency and satisfy this demand with less costs. Considering both the emergence of sustainability and supply chain management, it seems logical to presume that coordination among supply chain partners will bring about a more sustainable and responsible (people and planet) supply chain, just as it brings about a more efficient (profit) one. Although much of the sustainability literature in supply chain management has been focused on the environmental side of sustainability, considering the effect on people (employees and communities) has received much less attention. In this contribution, we provide a blueprint for a sustainable and responsible supply chain incorporating elements of human resource management. Since supply chains are often geographically dispersed, information systems plays a crucial role in sharing information on the environmental impact of operations and metrics quantifying the effect of operations on workers and communities.

Keywords: *Triple Bottom Line, Human Resources, Information Systems, Supply Chains*

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INTRODUCTION

Supply chain management as a field has emerged from a mature understanding of the contemporary nature of value adding processes. In a supply chain, partners collaborate and coordinate actions to result in the fulfillment of consumer demand. It is now accepted that effective supply chain management results in increased profits and better service levels. For many products, true collaboration of supply chain partners, where each makes decisions in the interest of the whole chain rather than the individual firm, results in significant, quantifiable benefits.

Meanwhile, concern over the environment and the plight of working people has given rise to the push towards sustainability. As mentioned in Hart and Christensen (2002), if the non-developed countries consumed as much as the developed countries, four planet Earths would be needed to supply the material, energy, and provide for disposal. Meanwhile, Mintzberg et al (2002) point out that during the nineties, while CEO pay rose by 570% and corporate profits by 114%, the average worker salary

increased 37%, barely keeping up with the 32% inflation of the period.

There are different views of sustainability in the realm of management. In its more sophisticated manifestations, sustainability demands a triple bottom line view, where profit is balanced with the effects of business on people and the planet.

While there has been great work done examining facets of sustainable and responsible supply chain management, a comprehensive top-down view emphasizing the triple bottom line has been lacking. This paper aims to make a contribution towards this end.

In the next (second) section, we start by examining supply chain management as a field as well as comparing various views of sustainable management. In the third section, we will examine supply chain processes from a top-down view, viz. procurement and suppliers, manufacturing and logistics, and marketing channels and distribution, in turn. We will end with some concluding comments and suggestions for future work.

SUPPLY CHAIN MANAGEMENT AND SUSTAINABILITY

Supply Chain Management

Almost every product we examine today is brought to us through the cooperation (in the widest sense) of several firms. The product was manufactured by a manufacturer and distributed by various parties to retail points of sale. Also involved were the suppliers of the manufacturer, and their suppliers, and so on. As it became apparent that these firms could increase their combined profits through (now in a more narrow sense) cooperation, the field of supply chain management emerged.

In an example of supply chain coordination, we can imagine a supply chain with a manufacturer, supplier, and retailer, in addition to the customary terminal member, the consumer. The end customer pays the retailer a certain amount of revenue for the purchase of the good. This revenue represents the sum of all of the revenue that the chain might gain from providing the product. Meanwhile, each incurs a cost in providing their part of the value addition which takes place. Each partner sells

the intermediate product to the next downstream product, receiving part of the revenue through the price. In the past, each partner would make decisions only in their own firm's profit maximizing interest. Suppliers would decide on the price of the input, the manufacturers would decide on the amount to order, each considering their own profit. Likewise, manufacturers would decide on the price to offer the retailers, and the retailer would decide on the amount to purchase. As an aside, this is exactly what we previously referred to as cooperation in the narrower sense, and this represents the status quo.

Under coordination, supply chain partners would share cost (and other) information to determine the prices and quantities at each stage which will result in the highest profit for the chain as a whole. This typically involves some partners making disadvantageous (if viewed in their own isolated interest) decisions, decisions which potentiate even greater gains to other partners. Coordination concerns itself with calculating the optimal decisions and necessary payments between partners to allow for the coordination. In other words, those partners whose gains were large

must subsidize the others, else the coordination would never take place. This is only one example which centers on procurement price and quantity decisions. Other examples of supply chain coordination where partners collaborate much more closely than traditional relationships held by two profit maximizing firms can be seen in other areas like training and development and facility co-location.

Since this is the case, it can certainly be said that nowadays competition is less between forms and more between supply chains. It matters less what an individual firm does as much as a firm is dependent on its partners. In the more globalized world today, supply chains are strewn across wide distances. This means we are moving ever increasing amounts of product around, creating more environmental demands. We are also less aware of the actions of supply chain partners which are further and further away. Just as successful demand fulfillment requires a supply chain approach where all of the actors are considered, having a sustainable supply chain will also logically require coordination between firms. After all, it does little good if a product is manufactured in an

eco-friendly manner if the manufacturer's suppliers and distribution channels contributed large demands on the environment.

Sustainability

The world has seen a lot of population growth in recent decades, and this coupled with shorter and shorter product life cycles has resulted in much concern on our ability to meet our own demands without sacrificing future generations abilities to meet their own needs, the classic definition of sustainability given by Brundtland (1987). This concern has resulted in everything from legislation mandating product stewardship to green marketing. It is also clear that in the field of management, agreement on what constitutes sustainability has not yet been reached.

In its narrowest sense, sustainability could merely refer to providing sustainable profits to shareholders and owners, *profit sustainability*. In the classic story told to students, the owner of a forest would be a fool to cut every tree down. Although he would have large profits in the first year, there would be several years with no profit. To those who espouse this narrowest view, the loss or

interruption of the stream of revenue (or profit) is what is important to avoid. The trees and forest are only a mechanism to reap the profits, not something valuable in and of itself.

In the next view of sustainability, *environmental sustainability*, the trees and forest (more broadly environmental burden at large) are taken into account alongside profit and revenue. Decisions here would tend to balance the two extremes, delivering less profit than an original solution but with much less environmental burden. While this may seem simple, in reality there are many possible options and comfortably arriving at an acceptably satisfying solution is far from trivial, especially when several decision makers are involved.

Arguably the most sophisticated manifestation of sustainability is seen in the push towards the *triple bottom line*, where *profit* is balanced alongside *people* (stakeholder) and *planet* (ecological) concerns, the so called 3 p's (Elkington 1994). This view of sustainability shares inherent concern for the environment with environmental sustainability, while additionally considering workers and communities which

are impacted by business activities. While there is little doubt that the concern about the environment is well placed, we believe that businesses can contribute to a better society by ensuring that commerce contributes positively to workers and communities and therefore society at large. There are certainly instances where we should restrict our attention on a subset (e.g. profit and planet) in a certain context (e.g. sustainable logistics networks), but this is not generally the case and we believe that sustainable decisions must seek to balance all three p's.

SUSTAINABLE AND RESPONSIBLE SUPPLY CHAIN MANAGEMENT

Procurement and suppliers

In order to produce something, typically manufacturers will require many inputs from suppliers. These can range from raw materials like rubber or plastic to sophisticated components and modules. Suppliers are typically selected by the total landed cost, the cost including e.g. transportation and custom clearance, all costs necessary to land the goods at the buyer. While cost is important, since it influences profit and the firm must remain profitable,

additional considerations are needed.

The firm can and should juxtapose the environmental burden caused by the production of the input. This would include the supplier's supplier (i.e. second tier) and subsequent tiers, and so would capture the entire supply chain environmental cost up to that point in the value adding processes. In this manner, a purchaser could compare several suppliers.

Likewise, the suppliers' *people* performance could also be measured and compared. While some suppliers offer a living wage and benefits to employees, others will seek to avoid these costs. Some firms will seek to be a good neighbor by investing in local communities over a long time horizon, while others will view the relationship in a short term, arm's length manner without considering local communities more than immediately necessary.

A firm which believes in sustainability and the triple bottom line will naturally seek to do business with suppliers who are fellow believers. Comparing suppliers based on cost, environmental, and social performance

will contribute towards encouraging firms to adopt the view as well as our ability to offer the consumer a truly sustainable product.

Production and manufacturing

Traditionally, operations management, which fulfills the demand for a product, is the functional area where the majority of the costs are incurred. Producing goods requires labor, capital, and management in various proportions depending on the industrial context. Because of this, it is natural to presume that there might also be a large impact on sustainability by decisions made in production and manufacturing (Kleindorfer et al. 2005).

The environment is affected starting with the product design itself, and various design alternatives (product designs where the product has the same functionality) might differ greatly in the amount of material and energy needed to produce the products. Here, one must bear in mind that the weight and packaging of the product will affect the amount of energy needed to distribute the product generally. The choice of material is important, something that becomes essential when

considering product recovery as we will soon discuss. Likewise, hazardous materials can be utilized or avoided. Lastly, the same product with the same design can be produced in more than one manner, and production tooling will be another differentiating factor.

It is particularly relevant to mention the role of product recovery management (PRM) within the field of sustainability. In PRM, products which are at the end of their life or use, like engines which have failed or photocopiers returning from a lease, can be recovered by the manufacturer and used in some manner. This might entail disassembling the returned products, inspecting the parts, and reassembling a good as new “remanufactured” engine, as is done at several large German auto manufacturers. In other cases, the recovered products can be recycled, decreasing the amount of material needed from the Earth.

Manufacturing also impacts several groups of stakeholders, such as employees and communities. Employees are impacted by e.g. compensation, working conditions, and worker safety and health issues. Compensation

should include not only remuneration, but also employee benefits and the like. Working conditions would include scheduling collaboration and training and development. Lastly, worker health and safety issues would protect employees’ short and long term health. It is easy to imagine situations where the firm would have financial pressure to pay workers inadequately or ignore safety concerns, and true sustainable (and therefore responsible) management should seek to address also these concerns.

Marketing channels and distribution

Once produced, the product must be distributed to the market, and the channel will generally depend on the product and geographic market served. Here also, different distribution options and partners will result in a more or less sustainable and responsible solution.

Environmental sustainability here would demand the incorporation of environmental costs in distribution network decisions, even in a multi-firm context as seen in Langella and Zanoni (2010). When deliberating retail partners, environmental

performance of the retail chains can be examined for suitability.

Arguably more interesting is to examine differences in the manner in which different retailers treat their employees. Here, there are a couple of good examples which will provide some illustration. In the United States, Sam's club competes against Costco in the wholesale market. Where Sam's club compensates employees at minimum levels and resists unionization, Costco is known to pay its employees a living wage with benefits and takes a long-term view of its relationships with employees. As pointed out in Cascio (2006), Costco financially outperformed Wal-Mart, providing support for those who believe that companies can do well by doing good, and that unethical decisions are by no means a prerequisite for success rather the seeds for failure. In Germany, a similar juxtaposition can be made between Schlecker and dm in the retail drugstore market. Schlecker has been criticized for some time for wage levels, working conditions, and union avoidance concerns. As pointed out in Der Handel (2011b), Schlecker maintains a list of employees which the firm considers important enough to "keep an eye on". The list, some

20 pages, includes union organizers, senior (and therefore expensive) employees, and other select employees. Der Handel also points out that employees (their person, clothing, and locker) are subject to search at any time and may well result in dismissal if an item is found which is sold at the store and the employee is unable to prove that it was purchased. While Schlecker was traditionally stronger based on market share, dm has made substantial gains in the past years and has narrowed if not closed the gap (Der Handel 2011a). Even though Schlecker has made attempts to improve its employee relationships, continued growth for dm is expected both in number of outlets as well as market share.

Since these retail partners are quite different, more responsible and sustainable firms will seek to do business with retail partners who likewise espouse these views. While this may seem odd, to decide against some retailers or channels, and thereby sacrifice revenue, companies like Snapper correctly identify this as a moment to differentiate (Fishman 2007).

It is helpful to remember that while this might be difficult even

in a domestic, single country context, making these decisions will much more challenging when considering multiple international markets which have resulted from globalization. In this case, there are a plethora of decisions to make and information on performance (cost, social, environmental) will be more difficult to gather from geographically dispersed partners and candidates.

CONCLUSION AND OUTLOOK

As we have seen, a truly sustainable product will be delivered by a truly sustainable and responsible supply chain. This means not only being environmentally sustainable but also socially responsible. In this endeavor, human resources can enable the firm to increase the satisfaction of employees through financial and nonfinancial measures.

A supply chain which is sustainable and responsible starts with having sustainable and responsible suppliers. These suppliers will be judged not only on cost (although this will inarguably also be a factor) but also on their environmental and social performance. This will entail gathering a large amount of information in order to arrive at a supplier

selection decision as well as to monitor suppliers. This is an area where management information systems will be instrumental.

The products will be designed and produced in an efficient manner, again balancing the 3 p's of people, profit, and planet. The product must first be designed with sustainability in mind. Then, it should be produced as efficiently as possible, as seen from a cost and environmental point of view, while ensuring that worker's rights, including the right to a living wage and benefits, and workers' health and safety is not risked in the name of profit. Not last, the supply chain should have mechanisms in place to recover the product, sometimes called closed loop supply chain management. As has been noted in the excellent contribution of Drake et al (2011), modeling methods in operations research which incorporate stakeholder concerns have enjoyed somewhat limited attention in the past, and we believe this stream should be very fruitful in the years to come.

The products will also be distributed in sustainable and responsible distribution and marketing channels. Here, different channels will be judged for each

geographic market based on their triple bottom line cost. In this area, it could be the case that a sustainable and responsible firm must decide not to do business with certain retail and distribution channels and might be enticed to either insource or perhaps collaborate with like-minded firms to form suitable channels.

There remains many open areas for future research attention. First, developing reasonable and acceptable standards regarding employees' compensation, work conditions, and health and safety remains a subject of discussion. These standards could become qualifying criteria for potential suppliers and distributors. There should also be some attention given to deliberating a manner in which community concerns can be incorporated. Again, this should be a qualifying criterion to being a supplier or distributor. Second, meaningful environmental metrics must be identified and agreed upon. This will enable information on not only potential supply chain partners but also the firm itself. MIS will have to collect and analyze much more information than was the case in the past, and over greater distances.

BIOGRAPHY

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