

Meaning and Measurement of Value in Logistics and Supply Chains

Presented at CAITR 2004

The 26th Conference of the Australian Institutes of Transport Research

8- 10th December 2004, Melbourne

by

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Abstract:

Management is often concerned with “creating value” or delivering “customer value”. These words appear with regularity in transport texts, newspapers and journals. In transport today we discuss the “value chain”. A decade ago transport planners and economists were “valuing time”. A careful review of the literature shows that although the word, value, is frequently used in transport and logistics it is not defined.

This is a problem because the word is used in mission statements and key management objectives but what does it mean? Is there such a thing as “intrinsic value”? Is value relative or could it be absolute? Is value market driven, derived from individual use or some combination of use and exchange? The 18th and 19th century economists had much to say about these questions and they laid the foundations for a theory of value.

This paper discusses the meaning and measurement of the term, value, in transport and logistics. The paper examines the relationship between value, utility, cost and profit in order to understand what we could mean by value. Although the paper is in part philosophical, it uses cases in cost-benefit analysis, the value of time and environmental damage to propose an explanation of the meaning of “value” in transport and how it might be measured.

Introduction

What is value and why is it important? There are many definitions of value and the word itself is context sensitive. The word can be applied to describe a person's approach to life; his or her "values". In this case it may be similar to their ideals or their "world view". It can be used to describe a number or colour or musical note. In this paper, value is used in its economic or business context. In the business context it has been defined as the worth of something. A definition from the internet search engine Google suggested:

"the amount of money (or goods or services) that is considered to be a fair equivalent for something else"

The starting point of much popular management theory and strategy is Porter's 1985 seminal text, "Competitive Advantage: Creating and Sustaining Superior Performance". Porter doesn't specifically define value but we can get the gist of his meaning:

"Every firm is a collection of activities that are performed to design, produce, market, deliver and support its product. A firm's value chain and the way it performs individual activities are a reflection of its history, its strategy, and the underlying economics of the activities themselves.

This is rather important because Porter's use of the word in the phrase "value chain" is used consistently in most recent works in logistics and supply chains. For example, Shapiro (2001) points out that:

The supply chain is a special case of the value chain for those companies that manufacture or distribute physical products. The value chain has been called the value added chain to focus attention on the firm's ultimate objective of adding value to its products or services at each stage in the chain. (Shapiro, page 13)

If you read texts in transport, logistics or supply chains, then you will find varying applications of the use of the word "value" and disputes arise about what constitutes value in a supply chain. For example, is value measured by the costs of production or the prices or the profits? How is it measured as a totality across all the organisations in a supply chain and can it be resolved into parts related to each organisation?

This paper begins a discussion on some of the nuances in value. It is worth thinking about if only to clarify what we mean when we talk about "value" or "adding value" in transport, logistics or supply chains. The paper is a work-in-progress and reflects dissatisfaction with the state of theory in supply chain studies which consistently discuss work in logistics related to "value" in all its various grammatical forms.

Background

Delving into economic history can be a daunting task. Roll (1954) provides a detailed and thorough introduction to the subject. Macquarie University has an excellent set of more current references on the history of economic thought on its economics department web site:

<http://www.econ.mq.edu.au/courses/econ356/lect.htm>).

But whatever you read, most writers on economics and modern business strategy all point back to Adam Smith.

Adam Smith (1776) in “The Wealth of Nations” was one of the earliest writers on value. He distinguished two different meanings of the word. There was a *value* in “use” and a *value* in “exchange”. The two can be quite different. Something can have great personal value or value in “use” but have little market value or value in “exchange”. Smith was troubled by the market value in exchange (price) and recognised that scarcity or abundance could cause the exchange value (price) to be volatile. He discussed the idea of an average price to be a better recognition of something’s “value”. He also raised the well known water and diamond paradox that was said to be resolved by the marginalist economists later in the 19th century. Economists such as Jevons (1871) and Menger (1871) built on Smith’s work introducing the idea of utility and marginal utility as a measure of value.

Economists differentiate between price and value. Some theorists have said that value is the integral of the area under a demand curve determined by the intersection with the supply curve. The intersection is the price but the value of a product or service is accrued total revenue. The idea is given in figure 1 below:

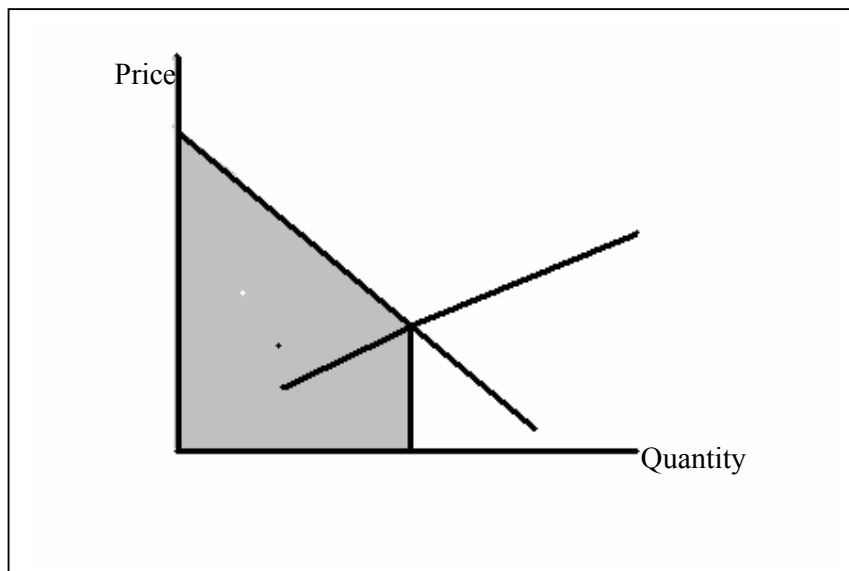


Figure 1: Value as area under the intersection of demand and supply curves

This is effectively using the idea of value in exchange, value as determined by the market. The problem of course, as raised by Smith in the 18th century is that market prices vary dramatically and so value becomes variable, dependent on the market situation. One day something can have great value and the next day almost nothing. The share market is of course the classic example. Can value be that ephemeral?

Marx argued that value was determined by labour and the wages determined the worth of something. This goes back to Smith’s idea of something constant or a standard by which to measure value. However, we know that not only labour is involved in creation and so value needs to be created by more than labour. Today we would include information or knowledge along with the factors of production. This would develop a theory of value along the supply side with costs measuring value. But is the cost of something the same as its value? No, not really, according to the economists.

Most classically trained economists (Neo Classicists?) would argue that the theory of value is soundly developed and rests on the work of Alfred Marshall and Hicks (1939) who sought to develop an axiomatic approach based on the concept of utility. Economists today would argue value is determined by a consumer's marginal utility (see a summary by Lazo, 2004) and value is therefore subjective. Essentially value becomes a function of an individual's utility function (whatever that is or might be).

As an aside, from a geographer's perspective, this is a bit like the physicist's quantum theory, no one has seen someone's utility function but it is believed to exist. It is a construct from the mind of the economist.

Transport Theorists, Logistics, Marketing and Value

Transport theorists generally have followed the approach of the neo-classical economists and used consumer preferences to model individual's utility functions. In the 1970's and again more recently, transport planners became interested in the value of time in order to quantify benefits from transport projects. It is a critical part of project evaluation. Well known transport economists like Hensher, and Taplin have devoted a considerable research effort into this topic as indeed have transport engineers such as Stopher and Richardson, to name but four transport theorists that are well known and highly regarded professionally. Ortuzar and Willumsen (2000) and Louviere et. al. (2000) provide discussions of the somewhat labyrinthine methods used to distil values of time.

Logistics academics such as Coyle, Bardi and Langley (2003) ground their discussion of logistics in the concept of utility. In particular they differentiate four utilities; form, time, place and possession. They say that economic utility adds value to a product or service. However, later in their work they use profit potential as a surrogate for value (see figure 4-3, page 123). They also go on to use value in a price context and:

define value of service pricing as "charging what the traffic will bear"
Coyle et.al. (2003) p394.

Yet another (logistic) academic view of value is given by Harrison and van Hoek (2002) who say:

While value is based on cost from the point of view of the company accountant, the concept of value may have a different interpretation outside the company. From the shareholder's point of view, value is determined by the best alternative use of a given investment. In other words, value is greatest where the return on investment is highest.
Harrison and Van Hoek (2002), p 51.

This view is common from a managerial or marketing perspective. See for example Bennett Stewart (1991) who introduces the idea of Economic Value Added (EVA) analysis as a measure of company worth. Bennett Stewart III and his company Stern Stewart define it in terms of net profit after all costs have been removed. This is similar to the work of Doyle (2000) who says:

The heart of shareholder value analysis is that economic value is created only when the business earns a return on investment that exceeds its cost of capital.

Supply chain studies tend to use the market or business definition of value, that is, it tends to be profit focussed. What are we to construe from all these explanations or use of the word value? Clearly logistics academics began on firm ground with utility but may have been seduced by the

business emphasis on profits and the opposite, of costs. Value is added if profits are made or costs are reduced.

The fundamental problem with this is that profit is ultimately tied to price and price to markets. Thus, returning to Adam Smith's arguments, the market determines value and value becomes dynamic or volatile depending on the supply and demand.

Adam Smith seems to have understood supply chains rather well if one follow his reasoning in the Wealth of Nations:

In the price of flour or meal, we must add the price of the corn, the profits of the miller and the wages of the servants; in the price of bread, the profits of the baker, and the wages of his servants; and in the price of both, the labour of transporting the corn...

Adam Smith (1776) page 54

This is rather similar to Shapiro's approach to value in a supply chain that was discussed earlier. This is what led Smith to suggest using prices averaged over a longer period of time to avoid the fluctuations in prices and therefore value, if indeed we were to link value to price or profit.

Measuring Value or Valuation

There are many approaches to measuring value depending on the particular knowledge domain. Transport engineers and economists use discrete choice models to measure the value of time. Information systems managers can use Bayesian Theory to measure the value of information. Clemen (1990) describes how the value of information can be measured using before and after information and expected value theory. Land valuers use a variety of methods to determine the value of a block of land or a building. Investment theorists such as Damodaran (1996) describe a variety of financial techniques. The share market uses the term "intrinsic value" and defines it as:

The difference between the current market price of the underlying asset and the exercise price of the option or warrant, but not less than zero.

These techniques rely upon discounting to take time and interest into account but they still revolve round the market price.

However, the use of the word "intrinsic" is important because it seeks to imply that there is some underlying value that is not subject to the whim of a market. Adam Smith used the idea of an "average price" which took into account the swings of the market and reflected a stable or long run equilibrium price that reflected the stored amount of effort that went into something.

Kaplan and Norton (2004) discuss a company's cultural values and how to measure the value propositions they create. These are the authors of the "balanced score-card" and they associate value with profit when describing how leader's create value. In the final analysis, one gets the feeling that for all their "balances" when "push comes to shove" in the business world it is the annual profit (or loss) that is counted. But they do have a broad set of measures that is worth examination (figure 10-5), page 284. These could be used to construct a more broadly based interpretation of value than just profit.

A useful definition of business value creation is suggested by Institute of Internal Auditor's, who define "added value" as:

***Add Value** - Organizations exist to create value or benefit to their owners, other stakeholders, customers, and clients. This concept provides purpose for their existence. Value is provided through their development of products and services and their use of resources to promote those products and services. In the process of gathering data to understand and assess risk, internal auditors develop significant insight into operations and opportunities for improvement that can be extremely beneficial to their organization. This valuable information can be in the form of consultation, advice, written communications, or through other products, all of which should be properly communicated to the appropriate management or operating personnel.*

The institute of internal auditors, Chicago, see internet site:

http://www.theiia.org/iia/index.cfm?act=content.form&doc_id=1668

So what does it all mean?

From a reading of the current logistics and supply chain literature it seems fair to say that there is confusion in the use of the word value. This seems conspicuously absent from the transport theorists who have not strayed far from the neo-classical economics view of utility and preferences determining value (regarding time).

In transport project evaluation value seems to be defined in terms of a difference, a saving of time. There is a time before a treatment and then a time after a treatment. Less time expended is taken to be related to increasing the value of a project because it increases the savings of time for individual consumers. So could we say that value is a difference?

To continue the transport example, consider the construction of a bridge. The bridge itself is worth something. From the supply chain perspective as indicated by Adam Smith and more recently by academics such as Shapiro, for example, the bridge is a creation, a product that by definition of its use must have value. This value is comprised (using the Adam Smith approach) of a whole host of people and organisations in the production process. So maybe value is a store or a stock? Perhaps some sort of integral of effort and resources consumed?

Is it going too far to say that maybe value could not only be subjective but relative and at the same time absolute? That value is a context sensitive word not to be taken casually in sentences on the aims and objectives of a business?

Work is important to people and a service or activity that creates something is a statement about the worker and the organisation within which it happens. It may be driven by customer demand but the market may change its mind and judge the work "worthless". It may not be consumed. But that does not diminish its importance or use to the worker, or maybe the society, so I would argue for a qualifier such as "intrinsic" which reflects the effort, creativity and discipline of the worker or organisation.

Markets are not the be all and end all of society. Markets might be efficient in allocation of resources but just because something fails in the market, it can still have personal utility and meaning. The other use of value, again as presented by Adam Smith who also wrote "The Theory of Moral Values".

Acknowledgement

I am indebted to the Reverend Tim Costello and his opening address at the last ATRF in Adelaide for bringing Adam Smith's first work "The Theory of Moral Values" to my attention.

I also am indebted to my late father-in-law for the use of his 1985 Falcon 500 which the market says is worth at most \$4,000 but I know is worth much, much more.

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