

## **BACK TO BASICS - AN OVERVIEW OF VALUE MANAGEMENT**

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### **ABSTRACT**

An overview of Value Management is presented describing its historical roots and recent applications. Commencing with Bernoulli's assertion that "the value of an item is not found in its price but in the utility that it yields", the paper goes on to describe Miles' early work in Value Analysis, further work in Value Engineering and current developments in "soft" Value Management. Notions of value, function and purpose are described and a case study example is used to demonstrate how function identification may be used to enhance value.

Keywords: Value Analysis, Value Engineering, Value Management, Soft Value Management

### **INTRODUCTION**

The purpose of this paper is to help set the scene for the conference by providing an overview of Value Management, explaining some basic principles, and giving applications and examples. In doing so, the paper emphasises that Value Management is intended to focus on "value" as opposed to "cost". Establishing the cost of a product or service is relatively easy to do and there are countless ways of cutting costs. But establishing the "value" of a product or service is quite different. "Of value to whom?" one may ask and on what basis is such value determined? It seems that clients everywhere seek value for money as a primary requirement - not necessary the lowest cost but certainly value for money.

Value Management is about achieving good value in products, systems, services and projects. Its basic principles are as applicable to a large new building complex such as a hospital as they are to a small manufactured component such as a can opener. Since Value Management commenced its journey (as Value Analysis) as a formal discipline in the late 1940's and early 1950's, it has come to be practiced on a world-wide basis and in wide-ranging applications. In some cases, the discipline is still practiced in its original form as developed by Lawrence D. Miles in the United States. In other cases the methodology has been extended substantially, resulting in approaches which are far removed from its original form. Value Management is practiced in a formal or informal way throughout the world, and many countries have established Institutes of Value Management in a way similar to that of the local Institute here in Hong Kong.

Whilst in its original form, Value Analysis focused exclusively upon reducing unnecessary cost of manufactured products, many other benefits have been targeted and achieved over time. Documented cases of value improvement achieved through substantial capital and recurrent cost reduction, life cycle cost savings, performance-improvement, time savings, and process efficiency improvement are in abundance. Additionally, the method has been highly successful as a vehicle in strategic and conceptual planning, business planning and project initiation. Further applications have been made such that Value Management is consciously used as a vehicle to enhance learning in project teams and organisations thus, improving their effectiveness. There is really no limit to the application of the basic principles inherent in Value Management methodology and there are innumerable examples of benefits accruing as a result of its application.

### **HISTORICAL BACKGROUND**

In 1731, Daniel Bernoulli delivered a paper to the Imperial Academy of Sciences in St. Petersburg entitled "*Specimen Theoriae Novae de Mensura Sortis*" (Exposition of a New Theory on the Measurement of Risk). Bernstein (1996) captures the central theme of

this paper in the following statement: "the value of an item must not be based on its price, but rather on the utility which it yields". Similarly, in 1871, William Stanley Jevons published a major work entitled "Theory of Political Economy". In this paper, Jevons made similar comments to those of Bernoulli and declared: "value depends entirely upon utility" (Bernstein, 1996). Whilst Value Management as a discipline did not commence its journey until the late 1940's, (as Value Analysis) it is a fundamental tenet of Value Management that value of something is directly related to its function.

Beginning in the 1940's, Lawrence D. Miles developed a system of identifying and removing "unnecessary" costs. He called the system "Value Analysis". The system was based upon the principle that all cost is for function (utility). It is this system of Value Analysis which formed the roots of modern Value Management. A key principle of the system is that cost-cutting alone does not, of itself, lead to good value. In removing "unnecessary" costs, required quality and performance must always be maintained.

Miles created the system of Value Analysis when working for the General Electric Company of Chicago, USA. Dell'Isola (1982) describes how Miles was asked to address an apparent paradox at the company when facing shortages of materials in the years immediately following World War II. "The management of the company noted that in circumstances when they needed to purchase substitute products due to the unavailability of the ones which they had specified, the substitute products sometimes cost less and actually performed better". A decision was taken to explore the possibility of seeing if these unintended (yet desirable) outcomes of the materials shortage situation could, in fact be achieved by some deliberate process or processes. Miles was assigned the task and eventually designed a system which he called Value Analysis.

In describing Value Analysis, Miles (1980) says that: *Value Analysis is a disciplined action system, attuned to one specific need: accomplishing the functions that the customer needs and wants, whether those functions are accomplished by hardware, service, a group of people, professional skills, administrative*

*procedures or other at the lowest cost. In its disciplined thinking, Value Analysis is comprised of specific mind-setting, problem-setting, and problem-solving systems. These systems will assist anyone who has the task of providing more of what the customer wants for less cost. The same author (1961) wrote, "Created for one purpose - identification of unnecessary costs - Value Analysis is a novel procedure for deriving much needed results; this it does through a common sense approach which yields startling efficiency."*

The process quickly spread throughout the industrialised world, still focusing upon manufactured products. As time went by, the application of Value Analysis was extended to new product development and to whole systems. The process had a profound influence upon the manufacturing world.

From its early days, Value Analysis developed as a team approach to problem solving. Miles (1989) describes his method as *a problem solving system implemented by the use of a specific set of techniques, a body of knowledge, and a group of learned skills. It is an organised, creative approach that has for its purpose the efficient identification of unnecessary cost i.e. cost that provides neither quality nor use nor life nor appearance nor customer features.* Central to the method is a small team of people. This team is multi-disciplinary and drawn together from various components of the system in which the product is placed. Such a team for a study of a product may, for example, include representatives from marketing, manufacturing, and purchasing.

## **THE NOTION OF FUNCTION**

Universally, the conventional literature of Value Management places function analysis at the heart of the whole Value Management process. As previously stated, "value" is seen to be in the utility (or function) of something, and not in its price or cost. It is from the usefulness that something provides that value can be determined. This, of course, will change from person to person, place to place and time to time such that a product in one situation may be of extremely high value whereas in another situation, the same item may have no value at all. Miles (1989)

exemplifies this when he states that all customer needs may be expressed in terms of function: *“The customer wants someone, perhaps him or herself, pleased. The customer wants something enclosed, held, moved, separated, cleaned, heated, cooled, or whatever, under certain conditions, and within certain limits; and/or the customer wants a shape, a colour, an aroma, a texture, a sound, a precious material, or whatever to bring pleasure to him or herself or others that he or she wishes to please. That is all the customer wants. That is all the customer cares about. Thus, the language of function is the language of the heart of the problem. The customer wants two and only two types of functions in varying degrees in different products or services — use functions and aesthetic functions serve his needs”.*

The Australian and New Zealand Standard (AS/NZS 4183-1994) is typical of the Value Management literature in its reference to function. It defines Value Management as follows: *“Value Management is a structured, systematic, analytical process which seeks to provide all necessary functions at the lowest total cost consistent with required standards of quality and performance.”*

Miles' observation has led to a firm principle that all customer-needs may be expressed in terms of function and that such functions may themselves be expressed as "use" and "aesthetic" functions. This principle has become central to Value Management thought and practice. Value Management protagonists argue that customers acquire goods and services because they desire or need something to be done, that is to say, the customer requires some function or functions to be performed. Consequently, a new school, for example, is seen as a vehicle to "educate children"; a new hospital to "treat cancer" or a new road to "connect cities". The argument supporting this approach is that expressing needs in terms of function, allows actual needs to be clearly articulated, thus providing a basis for the creation of alternative ways to achieve the stated functions (as opposed to achieving an alternative to the physical object). The meaning of function is taken to be broad enough to include, for example, such concepts as "delight" in architecture.

The following example illustrates the effectiveness of taking a function approach. A Value Management study had been called to evaluate a design proposal for a major railway maintenance facility, which was designed specifically for a completely new train. One component of the proposed facility was a "blow-down" building. Through function analysis, the activities and processes to take place within the proposed building were identified and encapsulated in the single function "blow-down trains". This function was described in some detail to participants in the study, but may be summarised as follows. The "blow-down train" function involves taking a train into the building, closing the doors and then, using compressed air, "blowing down" the underside of trains so as to remove dust and other accumulated material from the drive equipment which was accommodated on the underside of the trains. During the analysis of this function, a design engineer who was responsible for the design of the new train pointed out that since the new train had the electrical gear in the roof space (as opposed to the underside of trains as in the case of all previous stock) there was no need to go through the "blowing down" process. This then led the participants to the conclusion that since the function was not required, the supporting accommodation functions would not be required either and therefore the proposed building could be deleted. In the same Value Management study a number of processes improvements were identified which would substantially reduce capital and recurrent cost of the facility and improve efficiency and effectiveness of operations.

It is often suggested that such situations only arise because of mistakes made in planning and design. However, this is rarely the case. In by far the majority of cases, circumstances such as the one described above come about because of weaknesses in communication processes and also because of different perceptions of function and purpose. It is though the Value Management process that communication processes can be enhanced substantially and functions/purposes may be made explicit.

There are several techniques used to "model" functions. The most common of these is the Function Analysis System Technique

(F.A.S.T.) developed in 1963 by Charles Bytheway. The technique enables a set of functions performed by a product to be expressed in terms of a diagram similar to a critical path precedence diagram. Bytheway's F.A.S.T. diagrams became a central part of Value Engineering and continue to do so to this day. Derivations of F.A.S.T. include customer and task diagrams as well as other such as function/purpose family trees and cluster diagrams.

### **TERMINOLOGY - VALUE ENGINEERING AND VALUE MANAGEMENT**

In the early 1950s, the term "Value Engineering" was coined. There are differing explanations described by people who were active in Value Analysis at the time as to how the term "Value Engineering" came to be introduced. First, there is an explanation by Miles himself who describes Value Engineering, as *the name often used by qualified engineers in engineering work* (Miles (1989)). That is to say, when qualified engineers conduct Value Analysis on engineering work, they refer to the process as Value Engineering. Further, it is suggested that as the application of Value Analysis widened to include the process of engineering new products (as opposed to analysis of existing products) the term "Value Engineering" was introduced to reflect that change. Over the years, "Value Engineering" became the more common term of the two, subsuming, in most cases, the term "Value Analysis". To this day, however, there are some who prefer to differentiate Value Analysis and Value Engineering on the basis that "Value Analysis" is applied to existing products and "Value Engineering" is applied to new products. By far the majority of practitioners world-wide, however, use the term "Value Engineering" as the single term which subsumes the process of Value Analysis.

The term "Value Management" emerged during the 1980s. Most of the literature since that time has made no distinction at all between Value Management and Value Engineering and it is clear that many practitioners and client organisations also make no distinction. The two terms are used quite synonymously in the same way that

"Value Analysis" and "Value Engineering" are used synonymously. There is, however, a growing international movement which does differentiate Value Management from Value Engineering. The foremost author in this movement is Dr Stuart Green of the University of Reading (UK) who has published extensively in this field. Essentially, such differentiation is based upon the nature of the problem situation being addressed and the methodology selected to address it. Basically, in this movement, Value Engineering is seen as a "mechanistic" approach, applicable to well-defined engineering-type problems. Value Management is seen as a "collaborative, group-learning" approach (Barton, 2000). A further refinement of this growing movement is the classification of Value Management as "hard" and "soft" such that "Hard Value Management" is broadly equivalent to conventional Value Engineering, whereas "Soft Value Management" identifies the emerging application to "soft" complex problem situations.

One way of visualising these different approaches is to consider different problem types on a continuum as shown in figure 1. Here, two distinct problem "types" are shown, typically classified as "hard" and "soft". The term "hard" does not relate to the degree of difficulty posed by the problem situation but by its *nature*. Such a situation is typified by the problem of how to repair a flat tyre - a problem which is well-defined and understood. A "soft" problem situation is one in which cannot be well-defined and is characterised by a high degree of complexity, often having conflicting values and viewpoints. Such a situation is typified by the problem of what to do in circumstances such as those found in Kosovo, Timor or Northern Ireland. Most problem situations, which one encounters, will fit somewhere between those two positions.

It was through systems engineering that the notions of "softness" and "hardness" were first identified after recognition that methodologies which were perfectly suited to solving "hard" problems were not at all effective in addressing "soft" problem situations (Checkland and Scholes, 1994, and Wilson, 1990 ). Hence a new discipline of soft systems methodology was created. The development of Soft Value

Management may be seen as analogous to the development of soft systems methodology.

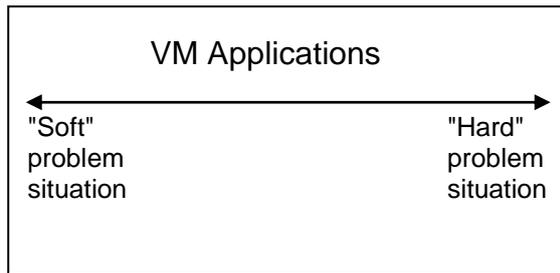


Figure 1 - VM Applications to different problem types

The process of Value Analysis commenced its journey as a "hard" problem-solving method, relating specifically to manufactured components. In recent years, a methodology to address "soft" problem situations has been developed. One example of such a methodology is that developed by Barton (2000).

## METHOD

Conventional Value Analysis and Value Engineering is typically conducted over five consecutive days, in what is known as a 40 hour value engineering workshop. The structure of these workshops comprise five basic phases, namely, information, analysis, creativity, judgment and development. This structure is typically referred to as the "job plan". During these five days, information is gathered; functions are identified, modelled and analysed; ideas are created as to how the functions can be performed in more effective ways; the ideas are evaluated; alternative options are developed, selected and implemented.

In soft Value Management, where the application may tend to address strategic planning, business planning, conceptual design and project initiation, the workshop component of the study tends to be of two days duration, using a large number of stakeholders (typically 20-30). All phases of a conventional job plan are covered during this two-day workshop. In the model proposed by Barton (2000) the exercise is seen as one of team learning using a co-facilitation approach. This model is now common in Australia, New Zealand, Hong

Kong and Singapore. The approach depends upon high-level facilitation skills because of the large number of people involved in the workshops compared to the small groups in conventional Value Engineering exercises. The large groups are necessary because of the number of stakeholders directly involved in the decision-making process during strategic planning and project initiation. Conventional Value Engineering often engages a completely separate team of people to "review" a proposed design whereas soft Value Management will involve the actual stakeholders (including designers) in the Value Management studies.

## CONCLUSIONS

This paper has provided a brief background to Value Management and shown the breadth of its application. In particular, the paper has emphasised that Value Management focuses on value as opposed to cost and also emphasised that value is not to be found in an item's price but in the utility which it yields. In most circumstances, it is "value for money" that is sought by customers, clients and stakeholders and it is this that Value Management seeks to achieve. The paper has also highlighted different approaches to "hard" and "soft" problem situations.

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