

CULTURAL INFLUENCES ON FUNDAMENTAL VALUE ENGINEERING METHODOLOGIES

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ABSTRACT

This paper will examine cultural influences on the VE process with the goal of improving communication, team dynamics and effectiveness of cross-cultural VE teams. The basic determinants of VALUE, including function, quality, cost and worth are evaluated within the context of unfamiliar cultures. Fundamental concepts and methodologies of VE are analyzed in relationship to primary cultural issues including religion, social customs, communication, economics and politics. Illustrations of these concepts will be provided from a study conducted for the Navajo Nation (Arizona). Concepts discussed in this paper will provide Value Engineers who practice in other countries and cultures with the insight and sensitivity to advance the objectives of VE in the expanding global economy.

Experienced value practitioners have a comfort level with the application of these concepts within the workshop setting. In most cases, this familiarity is associated with their application within their own country or culture. The Value Engineer conducting a study in an unfamiliar country or culture needs to "translate" their knowledge of fundamental VE concepts into the "language" of the client. The perception of Value, and those factors defining it, may vary greatly from one country or culture to the next thereby impacting the process, results and ultimate success of the VE study.

Cultural factors influencing the definition of Value and the VE process include religion, social customs, communication and economics. Case study examples for each of these factors are presented demonstrating their impact on the concepts of Function, Quality, Cost and Worth. These examples are excerpted from a 40 hour VE study conducted on the Pinon Dormitories Replacement/Expansion project for the Pinon Community Schools, Pinon, Navajo County, Arizona.

INTRODUCTION

A thorough understanding of the concepts of Function, Quality, Cost, Worth and their relationships is the fundamental technique which distinguishes VE from other cost-cutting activities. These important function-oriented analyses form the basis for the development, evaluation and ultimately the implementation of cost saving proposals.

BACKGROUND

The project consists of a \$16 million development and expansion of the existing educational facilities on a 48 acre site located in Pinon, Arizona approximately 300 miles northeast of Phoenix in the heart of the Navajo Reservation. The Navajo Nation is a sovereign, self-governing entity with their own judicial system and language. The

kindergarten, facilities management, cultural center and dormitories for boys & girls grades one through nine. Dormitory facilities are required to house students from remote areas of the reservation who spend most of the school year away from their families. Various design elements of the project reflect the influence of traditional Navajo culture and way of life and are intended to enhance the cultural awareness of the students.

RELIGION/SOCIAL CUSTOMS

Religious and social issues can have a significant influence on the definition of Value, Quality, Cost and Worth from one culture to another. During the Information Phase of the study, the design team and representatives of the Pinon Community School explained the religious and cultural symbolism of the design concept.

The Pinon Community School Campus is an expression of many traditional Navajo beliefs. On one level the campus plan represents a model of the Navajo Nation, with Pinon at its heart and surrounded by four sacred mountains (Figure 1). These mountains are symbolically represented by the major campus structures and are arranged in their exact geographical orientation from Pinon. Each of these four mountains are symbolized in the structures by differently colored roofs, adjacent crops, patterns and details. On summer and winter solstices and equinoxes, the sunrise is directionally marked by sandstone walls constructed of stone from the ruins of historic buildings.

On another level the campus functions similar to the traditional Navajo home or "hogan" (Figure 2).

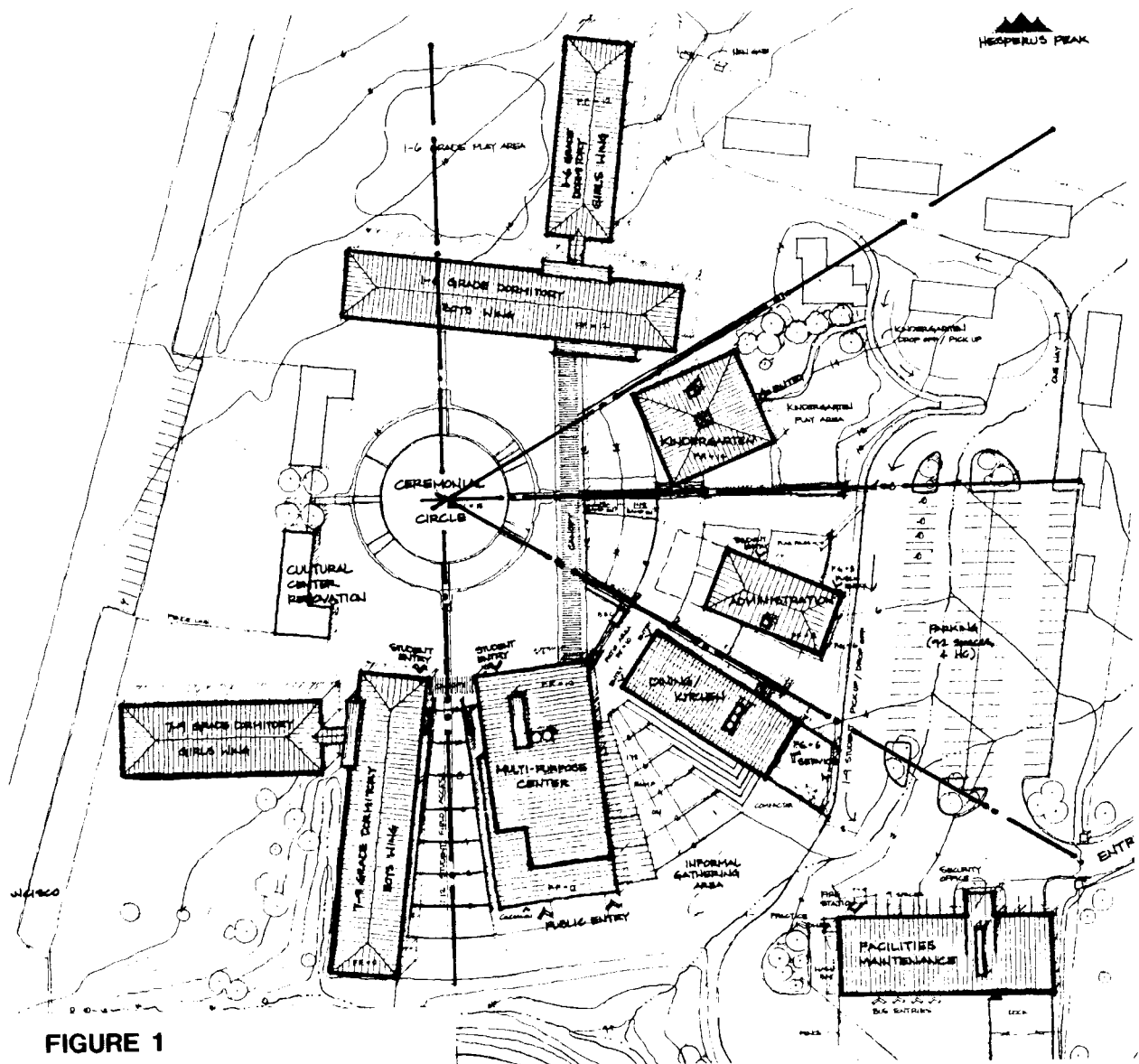


FIGURE 1

One enters the hogan from the east and moves, like the sun, clockwise around the structure. In the front of the structure are the work and living functions, in the rear are sleeping areas and in the center is the fire; connection of earth and sky. Directly opposite the entry is the place of honor.

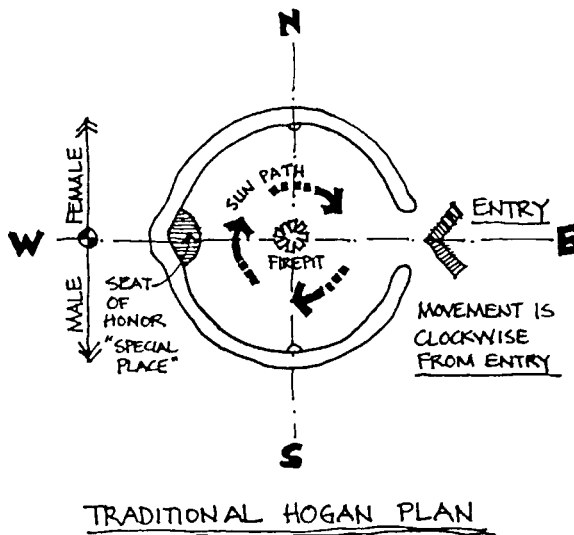
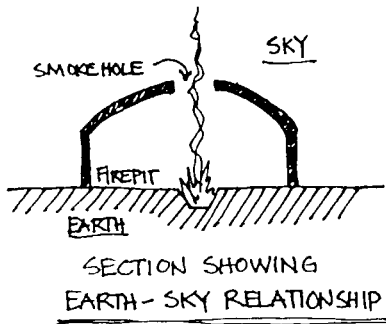


FIGURE 2

To arrive at the site one must spiral clockwise into the site from the paved highway, to the East entry. The "work" buildings shared by both the students and the public are in the front of the campus. The dormitories (sleeping areas) are in the back of the campus and the place of honor is occupied by the Pueblo Revival historic structure which is to be renovated into the cultural center for the community. These ideas and many others were incorporated into the project, in hopes that the young people who stay here will come to understand and appreciate the rich cultural heritage that is theirs.

After hearing the presentation on the design

symbolism, the VE team had a better awareness into what elements of the project represented value, quality and worth to the Navajos. Basic functions indicated on the Function Logic Diagram included "Promote Navajo Culture" and "Maintain Hogan Concept". Functional design alternatives were developed and evaluated within the context of these important functions. Without this sensitivity to the cultural symbolism behind the design concept, an obvious cost reduction proposal would have been to combine several of the freestanding structures into one economical building with a lower surface to volume ratio.

At the time of the VE study, colored asphalt shingles were specified for the roofs of the four symbolic mountain structures. Brightly colored metal roofs were proposed during the preliminary design but were deleted due to budget considerations. During the VE study, the Pinon Representatives were willing to consider other cost reduction proposals to fund the metal roofs which were of great value to the project. Since the completion of the study, this project has successfully bid within budget and the metal roofs were accepted as an additive alternate.

COMMUNICATION

The ability to communicate orally, graphically and in writing is critical to the success of any VE Team. Oral and written communication were not a problem since all representatives from the Pinon Community Schools were fluent in English. At one time, the school system, managed by the Bureau of Indian Affairs, forbid students from speaking their native language. Today the Navajo language is spoken and taught throughout the reservation .

Another important aspect in communication is the participation by the end user in the VE process. Typically the client or user is present at the beginning of the study and at the presentation of the final proposals. During the Pinon study, five representatives from the Pinon Community School were present and participated in every phase of the 40-hour study. This intense level of participation helped to foster better relations, creativity and positive team dynamics between the VE team and the user group.

In some cases, graphic communication can be more powerful than oral or written forms. During the evaluation phase of the study, a Quality Model

(Figure 3) was used to prioritize and document twelve competing value elements such as community values, user comfort, capital cost effectiveness and engineering performance. Consistent with the important basic functions, the highest rated elements were site planning/image and community values. This graphic, made up of concentric circles and twelve "compass points", was readily understandable due to its similarity in shape to the traditional hogan design and references to the sun, moon and solstices.

batch plant to service this project. The final evaluation indicated insufficient concrete quantities to justify the batch plant. A Cost/Worth analysis of the concrete systems at the inflated unit cost guided the VE team to seek other functional alternatives to all cast-in-place concrete designed for the project.

Other factors impacting the cost of the project are:

- Local contracting methods including competitive bid, negotiated contract, design/build, bill of quantities, local or minority preference
- Availability and skill level of the local construction workforce

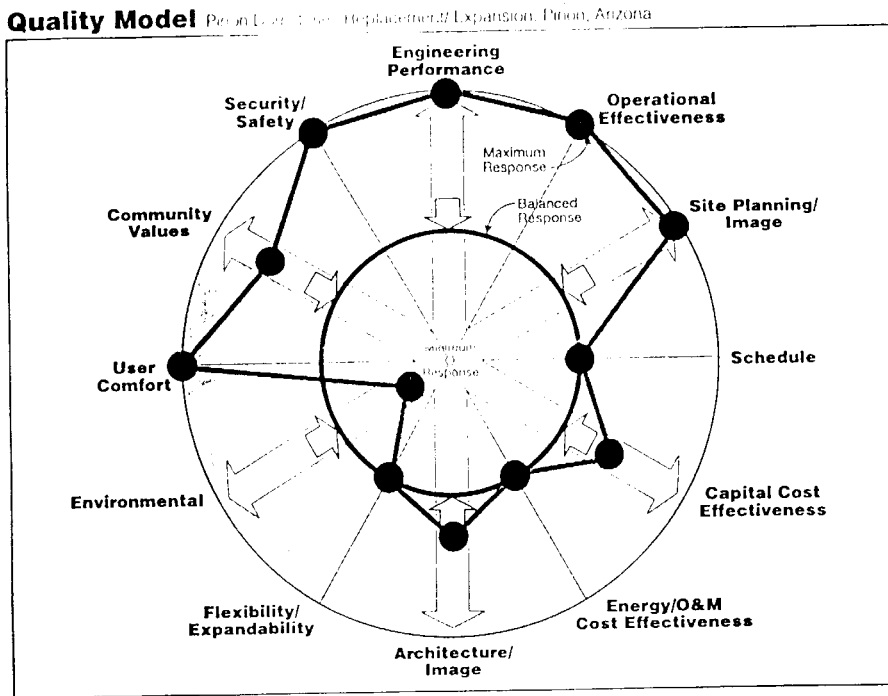


FIGURE 3

ECONOMICS

A thorough analysis and understanding of local construction market conditions can greatly improve your chances of accurately forecasting costs and potential savings.

An understanding of readily available construction materials and local construction methods is important when working in an unfamiliar country or culture. During the Information Phase, the VE team discovered that due to the remoteness of the project site, cast-in-place concrete was approximately twice the cost per unit compared to costs in metropolitan Phoenix. The nearest ready-mix concrete plant is located in Flagstaff, approximately three hours and 180 miles away. The team also analyzed the feasibility of building an on-site concrete

An evaluation of the local construction workforce revealed a shortage of highly skilled tradesman available on the Navajo Reservation. Of particular concern was the absence of qualified tile setters. The 40% design development documents submitted for the VE study detailed ceramic shower stalls for the 40 showers in the dormitory buildings. Knowing that qualified tile setters would need to be brought from off the reservation necessitating higher wages and per diem, the VE team considered other alternatives to ceramic tile.

Pre-fabricated shower stalls were recommended due to their ease of installation and lower life-cycle cost compared with ceramic tile.

LESSONS LEARNED

Cultural influences impact team dynamics, results and overall effectiveness in multi-cultural VE studies. The following observations are offered to improve cultural awareness, communication and success of VE studies in other countries and cultures.

- Use the Pre-Workshop Phase to research information on the local culture including religion, customs, traditions and economy. If

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possible, talk to someone from the country prior to the workshop to explore the possible implications these issues may have on the study.

- Consider staffing the VE Team with one or several members from the country or culture you are working in. This will help overcome the language barrier and alleviate the concern that a group of "outside experts" is coming in to tell them what to do with their project.
- Expand the scope of the normal Information Phase to include gathering background on religion, social customs and economics in addition to typical information such as cost, square footage and building systems. Include as part of the Design Briefing presented by the project team, a segment on cultural aspects which may have influenced the development of the design.
- Organize the Function Logic Diagram to identify basic and secondary functions which are culturally influenced and therefore of greater value to the project.
- Encourage the client representatives to actively participate in every aspect of the study. Participation can be increased by conducting the study on site or at the client's place of business making involvement in the study more convenient. The Value Engineering workshop is a dynamic, interactive process which achieves its greatest success through team interaction and participation.

REFERENCES

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