

FUNCTIONAL

ANALYSIS

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ANALYSIS SYSTEMS TECHNIQUE

SYSTEMS

TECHNIQUE

Introduction

- In 1964, this function based approach to the analysis of products and processes was enhanced by Charles Bytheway, who provided a **graphical representation** and **logical structure** to the **function analysis step of the Value Methodology**.
- The FAST technique has long been used in Value Engineering to analyze costs. Function Analysis System Technique (FAST) is a tool that has mainstay of the value management profession since its introduction In 1965.

WHAT IS VALUE?

- A product (or service) has good value if it has appropriate function and cost
- Alternative definition – Ratio of function to cost
- Always increased by decreasing costs
- May be increased by increasing performance if the customer needs, wants and is willing to pay for more performance.
- Maximum value is never achieved
- In normal usage, value is good if it offers somewhat better combinations of ideas, processes, materials and functions cost-wise than competitor

Basic Steps

Information gathering

- Asks what the requirements are for the object

Function analysis

- What does the object do?
- What must it do?
- What should it do?
- What must it not do?

Alternative generation (creation)

- What are the various alternative ways of meeting requirements?
- What else will perform the desired function?

Basic Steps cont...

Evaluation

- Alternatives are assessed by evaluating how well they meet the required functions and what will the cost saving be.

Presentation

- Best alternative is presented to management for final decision

All Cost is for Function

The customer wants a function!

- Wants something done – enclosed, held, moved, cleaned, heated, cooled, etc.
- Wants someone (perhaps themselves) pleased • Shape, color, aroma, sound, texture, “precious” material, etc.

Use functions

- Serve needs
- Entail some action that he wants performed

Aesthetic functions

- Please the user/owner

What is Function?

- “A product or process must do to make it work and sell,”
- It is the original intent or purpose that a product, process or service is expected to perform.
- In FAST Diagrams, the description of a function is restricted to a two word format – an **Active Verb+ Measurable Noun**.
- Ex. :- Carry Load; Transmit Light; Project Image.

Functions

- Products may require use functions, aesthetic functions or both
- Refrigerator, automobile, clothing, etc. require both use and aesthetic functions
- Concealed wire in a building, oil in an engine, etc. require only use functions
- Perfumes, artistic paintings, etc. have aesthetic function

Analysis of Function

- State the function in exact sentences
 - Is that exactly what it does for the customer?
 - Is that exactly what the customer wants it to do?
 - Is that exactly what the customer believes they're paying for?

Improve and clarify sentences until they say what the function exactly is

Name the function with a verb-noun combination

- E.g. support contact, enclose housing, radiate heat, etc.

Defining Function

- All functions can be defined in two words:
- An **Active Verb** and a **Measurable Noun**
- Examples of function for various types of studies:

Item:

Automobile

Refrigerator

Foundation

Road

Function:

- Transport People

- Cools Air

- Support Structure

- Routes Vehicles

Naming Functions

Some Verbs	
Contain	Secure
Move	Locate
Shorten	Space
Support	Rotate
Protect	Fasten
Prevent	Close
Control	Reduce
Modulate	Limit
Mount	Filter
Ignite	

Some Nouns	
Piston	Vibration
Volumes	Contacts
Torque	Panel
Switch	Paint
Volume	Rust
Current	Noise

- By constraining the description to just two words, it forces participants to clearly and concisely capture WHAT task needs to be performed, not HOW it is performed.
- This eliminates the physical constraints of the product from our thinking and allows us to explore alternatives more easily. It is a way of overcoming “functional fixedness” which is what Charles Bytheway was trying to accomplish.

FAST

- Fast diagrams provide a graphical representation of how functions are linked or work together in a system to deliver the intended goods or services.
- Functions may be performed by the process, product or system, into a How?/why? relationship.
- The FAST diagram presents the whole technical system with the inter-relationship of its various functions.

- Use of a FAST diagram based on the Why-How-When logic

Why?

- Leads back to the higher level function

How?

- Leads ahead to the specific function that must be performed in order to

When?

- Which functions must be performed simultaneously and sequential relationship with others.

The Basics of FAST

You will note in the figure that there are several different classifications of functions.

The two major categories are:

- 1. Basic Function
- 2. secondary Functions

Basic Functions: describe the characteristics or task which is the primary reason for the existence of an item.

It is what the product or process was actually designed to.

Secondary Functions: are those designed-in functions which are required to cause or allow the basic function to occur.

- It is any function that directly contributes to accomplishing the basic function.
- It can be further divided into several other categories which are known as sub-groups.

Dependent Function

- A function that depends on another function for its existence. ☐
Comes in to existence when a specific method is selected.

Independent Function

- Does not depend upon one other functions for its existence or on the method selected to perform those functions.

Support Function

- A function, which assists a critical function in doing its job so that it may be done in a reliable and acceptable manner.

Critical Path Functions

- Any functions which describe specifically how or why another functions are performed.

Higher Order Functions

- Higher order functions are reasons for the lower order functions to exist.
- In the FAST diagram they appear in the left-hand portion of the diagram

Lower Order functions

- Lower order Functions serve the higher order functions. Their existence depends on the relevance of higher order functions.
- In the FAST diagram they appear in the right-hand portion of the diagram.

- A few things that to be pointed out about FAST Diagrams: --- *There is no single “correct” FAST Diagram for a product, process, service or system.*

They can vary depending on:

- Focus of the analysis.
- Technology or customer focused;
- Objectives of the study in which it is used – cost reduction, process improvement or technical problem solving.