

VALUE WORLD

Volume 31 ■ Number 1 ■ Spring 2008
Published by SAVE International

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EDITORIAL

As winter ends, a new summer approaches. One thing ends and a new thing begins. This is a theme for this edition of *Value World*. My term as Vice President of Education soon ends and it's a time to ensure something new begins.

I often try, as editor of *Value World*, to bring you three or four papers grouped around a particular theme. I keep an eye on the number of pages such combinations produce so your printing is not excessive. In this edition I am bringing you two papers, but one of them is quite long, and both are worthwhile reads. Both papers expand what we might usually see as central to our task of producing more value for organisations. They point to new visions of what could count as 'typical' considerations for value engineering professionals.

The first, a rather long paper by Professor Marc Logman, explores concepts of value from a marketing perspective. The fundamental reason we exist is because there is a desire to create more value as ultimately recognised by customers willing to exchange stored value, in the form of money, for improvements yielding more benefits. This paper deepens our views of what such an ambition could encompass. My hope is it will lead to new initiatives in our community and open more doors to practitioners seeking opportunities to help organisations. It deepens the way we view what 'value' means and its role in the unfolding of "progress".

The second paper, by Dave Nave, explores alternative processes or methodologies that also seek to leverage more value. If we see our goal as value creation then we must look to alternative approaches and understand why they work



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and what we can learn by studying them. It's about enriching our ability to add value and deepening our awareness of the issues and constraints we must address.

As I get ready to hand over the VP-Education role to concentrate on helping the UK value society, the Institute of Value Management (IVM), I want to create an opportunity for a young academic to grow into a worthy editor of *Value World* and later to continue the "expansive" approaches to what VE is. It is with this in mind that I'd like to introduce a SAVE International member named Dr. Berawi who lives in Indonesia. I hope you will welcome Dr. Berawi and help him to serve SAVE International and all its members.

In closing, the conference in Reno, Nevada USA will soon be upon us. I will not be able to attend but want to point out such knowledge sharing events are what sustain us. As the world changes and economies adapt to the role the Internet has played in reshaping the industrial landscape, we must seek out new ways to enable added value as well as be willing and able to adapt.



Best wishes

Dr Roy Woodhead
Vice President - Education
SAVE International

Customer Value as an Ideation Tool

Marc Logman, Ph.D.

Abstract

In this paper a holistic customer value approach is suggested that deals with the “how”, “why”, “when”, “where” questions from a customer’s point of view. Moreover a cluster and correspondence analysis is performed using 200 innovations selected from various industries. It illustrates the relevance of the three dimensions that characterize the current innovation landscape: contextual relevance (why, when and where), personal/ environmental relevance (who) and behavioral change (how).

Different types of dependencies may be created between these dimensions to create new value to the customer. Making one move along one of these dimensions, may induce opportunities to make new moves along other dimensions. Therefore trade-offs and synergies between the “what”, “who”, “why”, “how”, “when” and “where” context should be analyzed in depth.

Several examples are given in this paper.

Keywords

customer value, ideation, innovation, dependencies

Customer Value and Ideation

New, market-driven product ideas are often inferred from customer needs and environmental changes.

Many ideation and product development tools based on customer needs have been discussed in the literature. For instance, the house of quality in the Quality Function Deployment approach lists customer needs, which are translated into design attributes. A matrix indicates how needs and attributes interrelate. An additional roof matrix deals with possible contradictory or reinforcing attributes that are needed to fulfil all customer needs (Hauser and Clausing, 1988); Griffin and Hauser, 1993).

Goldenberg and Mazursky (1999a) state that, instead of analyzing customer needs, analyzing the product itself allows future demands to be predicted. Analogous to Darwin’s theory of natural selection, it can be argued that given the changing needs of the marketplace over time, the products that will survive are those that adapt to the changing environment through alterations in their own attributes. The characteristics of a product can be divided into components (objects such as the legs of a chair) and attributes

(variables of the product, such as colour and height). A distinction can be made between internal attributes and components, controlled by the manufacturer, and external attributes and components, characterized by the customer context (for instance the weight of the person sitting on the chair).

Goldenberg et al. (1999a and b) define templates characterizing intrinsic changes in product configurations. One of their templates operates in the context of attributes. An attribute dependency matrix can be defined in which the columns consist of external components/attributes and the rows of a mixture of internal and external components/attributes. The confrontation of rows and columns may lead to new ideas which are based on interdependencies between previously unrelated components/ attributes (for instance the presence of urine and the appearance of a colour on a diaper). A step (level-related) function may characterize a dependency as in this example (the appearance of colour depends on the level of urine).

The other four templates in the Goldenberg et al. study operate in the context of components. Components can be removed, replaced, divided, etc. This may induce changes in the product’s functionality (maintaining, changing, removing functions, etc.). Goldenberg et al. (2001) observe that “successful” products tend to fit one of their dependency templates and involve a clear solution to a customer problem (offering functionality).

There is a clear difference between attributes and functions. Attributes can be described using adjectives (transparent, big, etc.), while functions can be described using verbs (it allows customers to “do” things) (Christensen, 2005).

Increased functionality may be created by various kinds of changes to product attributes. For instance (Kotler and Trias de Bes, 2003):

- Improvement of existing attributes
- Reduction of existing attributes
- Elimination of existing attributes
- Creation of new attributes.

Creation and elimination may be combined in case of replacement (Foster and Kaplan, 2001). Refinement of existing attributes may be another option (Horowitz, 2001).

Lastly, increased functionality may be created by “combining/bundling” multifunctional attributes (creating

dependencies). This can be achieved in several ways:

- Various complementary attributes, previously incorporated into different products, may be bundled into one new product. Cristol and Sealey discuss various integration levels (see Cristol & Sealey, 2000 and Sawhney, 2004).
- The other option is “nesting”, in which one attribute or function (previously independent) is incorporated or covered by another, is also a bundling option.

Sometimes a product may need to serve a double purpose, creating contradictions (attributes or functions that cannot be combined). The consumer may expect different functions from the product at various places or moments. Altshuller defined inventive principles, called TRIZ principles, to deal with these kinds of contradictions (from a technical point of view) (Altshuller, 1988; Hippel, 2005).

Towards a New Customer Value Ideation Approach

The ideation approaches discussed in the previous section mainly focus on dependencies between and across components, attributes and functions (see figure 1, below). The key question answered in these approaches is: “What is offered to the customer?”

The real value of an innovation is determined by the

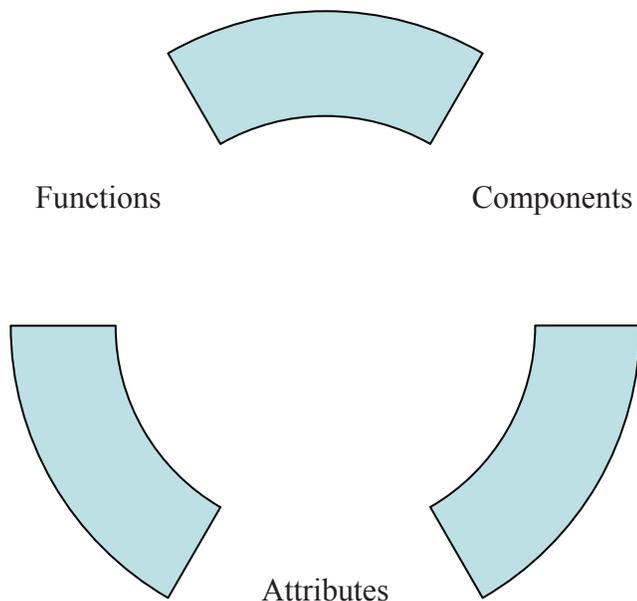


Figure 1. Dependencies in product focused ideation approaches.

experiences and actions customers face in using or buying products and complementary products at a certain moment, place and time (Cooper, 2000; Prahalad & Ramaswamy, 2003; Sawhney et al., 2006; Forsyth et al., 2006; Woodhead, 2007). It involves various external aspects of the customer context: “what” the new product can do for the customer, “why” they can use it (new applications), “when” and “where” it can be used or bought, “who” is involved and what actions have to be performed by the customer (“how”) (see figure 2, next page).

Kim and Mauborgne (2000) use an ideation approach in which utility levers such as simplicity, convenience, ... are contrasted with different stages of the experience cycle. It may be perceived as a matrix combining a “what” and a “when” dimension of customer value.

The stages in the experience cycle are:

- Production: e.g., creation of T-shirts by customer
- Pre-purchase (knowledge): e.g., CD box with button that allows listening to part of the music
- Purchase: e.g., order and pay for food through text messaging
- Delivery: e.g., language course by phone
- Use: e.g., ergonomic pan
- Supplements: e.g., car coating against dust
- Maintenance: e.g., public loaders for mobile phones
- Storing: e.g., folding carton toys
- Disposal: e.g., reused expansion barrel (of burner) in design (as a seat).

In today’s rapidly changing environment the customers’ reference framework becomes more holistic as they are facing substitute offerings from various industries dealing with similar customer problems (Dahl and Moreau, 2002; Kim and Mauborgne, 2000; Flint, 2002). Customer also experience many influences from their social context (for instance, government implementing regulations for increasing environmental friendliness).

Within this reference framework the customer will evaluate the gains and losses of new products (Logman 2004, 2007; Haksever et al., 2004 and Braet and Verhaert, 2007).

Benefit drivers (gains) may be:

1. Simplicity/usability
2. Performance/capability (due to increased performance of existing functions or the creation of new ones)
3. Fun
4. Customization/segment adaptation
5. Environmental friendliness (positive influence on society)

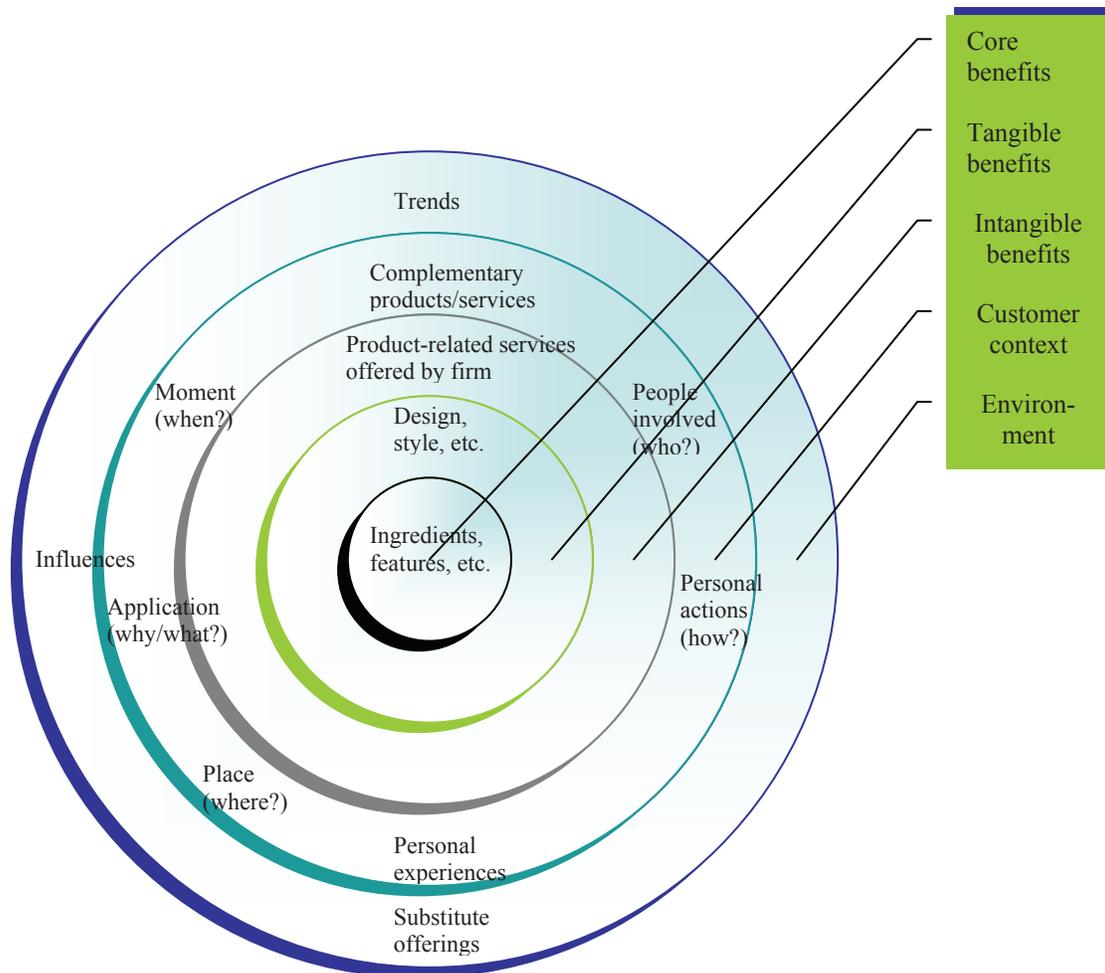


Figure 2. Holistic reference framework of customers.

Cost drivers (losses) may be:

6. Customer costs of adoption (monetary and non-monetary such as search as search efforts)
7. Customer disadvantages (unwanted or undesired functions in all contexts)
8. Customers costs of use (monetary and nonmonetary such as behavioral change/tasks to be performed)
9. Customer productivity/time
10. Customer risks (unwanted or undesired functions in some contexts)

Three dimensions seem to characterize today's customer value in particular.

Loss and Risk Dimension

Losses customers will incur in switching to new products often outweigh the gains from using them. This has been extensively studied in the literature on framing effects and loss aversion (Kahnemann and Tversky, 2000, p. 45-46).

Contrary to many studies on losses, a clear distinction is made in this study between reduction of losses (un-

wanted properties or functions), which are relevant in all circumstances/contextes (indicated as disadvantages) and those that are relevant in some circumstances/contextes (indicated as risks).

Several risk categories can be distinguished:

- Personal health: for instance, ergonomic products that diminish physical risks
- Personal safety: for instance, bicycle that decreases the risk of lurching
- Financial security: for instance, option to try out new product before buying (decreasing the risk of a wrong buy)
- Environmental comfort: high contrast projector usable in overlit rooms, etc.

The risk exposure will be the result of the probability of the context and the customer impact. For instance, a person driving a car may experience increased risks in situations of fatigue (Mueller et al., 2002).

Therefore risk is related to the "where", "when" and "why" dimensions of the customer context.

Behavioral change dimension

Verryzer (1998) finds that changes in consumption patterns (being highly correlated with familiarity and risk accordance) are key factors in affecting the customer's evaluation of new products.

Resistance may occur in particular when characteristics of the new product imply a change in behavior (more actions or more complicated actions to be performed by the customer) (Gourville, 2006; Calantone et al., 2006).

Innovations may imply shifts in the functions/tasks between company, customer, product and complimentary products in various ways (see figure 3).

tomizable products (customization by customer) (Logman, 1997).

(c) Shift between customer and company:

- From customer to company: for instance, the company performing actions/jobs previously accomplished by customer (e.g., in B2B handling customer storage, etc.) (Sawhney and Balasubramanian., 2004).
- from company to customer: for instance, in the context of customizability (providing increased customization options to customer).

The other arrows in figure 3 indicate possible shifts between products/services of complimentary players in the value chain and the interaction between these complementary offerings and the customer .

All these shifts are related to the “how” dimension of the customer context. It would be expected that task shifts from the firm/product to the customer induce the highest customer resistance. Von Hippel (2006) however observes that there also seems to be an increased interest in customizability (customers creating their own tailor-made solutions and hence not being resistant to extra tasks if they add personal value).

Environmental Dimension

Finally there is growing pressure to deliver products and services that are environmentally compatible (Gupta, 1995). Pollution prevention, waste management, etc., are examples of these hot topics. Trends such as

social responsibility, environmental friendliness, etc., involve various stakeholders (government, NGOs, companies pursuing corporate social responsibility, etc.).

The individual in relation to society refers to the “who” dimension of the customer context (Michell et al., 1995 and Bessant et al., 2005).

Based on these insights the following hypothesis is defined:

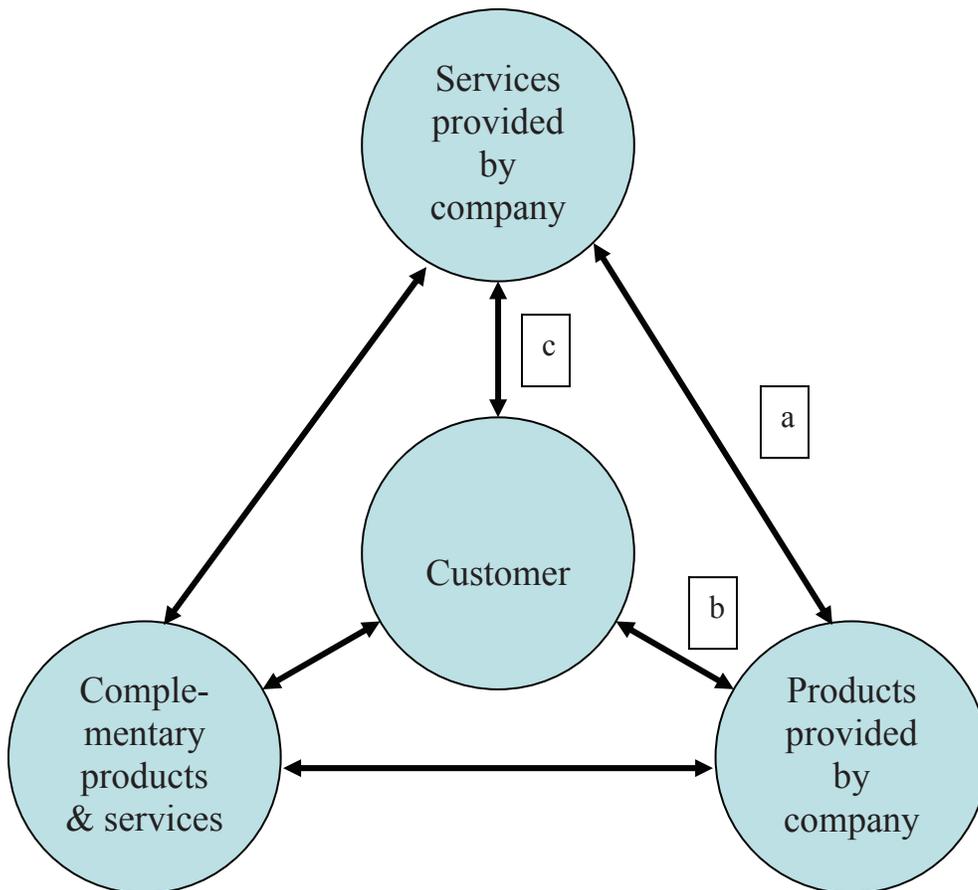


Figure 3. Shift in tasks/functions.

(a) Shift between company and product (in both directions): for instance, a company can remove a service, which is now performed by the product itself or vice versa

(b) Shift between customer and product (in both directions)

- From customer to product: the product itself taking over some of the customer's previous actions (for instance self-heating food).
- From product to customer: for instance, cus-

Today's value innovations (from a firm's perspective) are probably driven by three consumer related dimensions:

- the contextual relevance
- the type of behavioral change
- the personal versus environmental impact.

Empirical Study

Two hundred innovations (sample size) were used to analyze which value drivers are relevant in distinguishing various types of innovations.

The contribution of the "contextual", "behavioral" and "social" dimension (as discussed above) to this categorization was analyzed in more depth.

The innovations were selected:

- Partly from a business magazine that makes a selection of worldwide innovations each week (period selection: 2005-2007)
- Partly from the Creax innovation database (see www.moreinspiration.com).

Innovations were selected from various industries:

- Communication
- Mobility
- Lifestyle
- Food and beverage
- Wellness
- Home living
- Entertainment

An additional set of observations related to B2B (industrial) innovations was also included.

The first objective in the sampling procedure was to have a proportional distribution across all industries (as indicated in table 1). The second objective was to have a proportional distribution between the class of benefit and the class of cost drivers. In our sample 142 observations of innovations were detected that focused on at least one benefit driver. On the other hand, 118 observations were detected that focused on at least one cost driver.

Table 1. Frequency table across all industries

<i>Industries</i>	<i>Number of Observations</i>
Communication	22
Mobility	23
Lifestyle	24
Food and beverage	25
Wellness	24
Home living	31
Entertainment	24
Industrial (B2B)	27

Initially a cluster analysis was performed. Two categories of customer impact dimensions were included in the analysis, respectively dealing with:

- Value focus (cost and/or benefit drivers)
- Behavioral changes related to the innovation (shifts of functions/tasks)

Five variables were included within the category of benefit drivers/gains and five within the category of cost drivers/losses (see previous section for the description of the ten variables).

Moreover three moves in task shifts were included to deal with the changes in functions/roles between the company, the product and the customer: no or limited change in tasks, more tasks and fewer or less complicated tasks.

A binary scale was used for all variables (showing the characteristic: yes or no). Coding of each of these variables is based on trade press information in which the advantages and directions for use of the new product are described. Of course, in reality the benefit drivers and cost drivers make sense only from the subjective experience of the customer. E.g., what is "fun" to one customer might actually be scary or aversive to another. And on some talk radio stations in the United States, even environmental friendliness is not always a positive attribute, but has been demonized

A hierarchical cluster algorithm was run. The five cluster solution yielded the best results in terms of significance and meaning of the various clusters. Table 2 summarizes the distribution of number of observations across clusters.

Table 2. Frequency table of observations in 5 cluster solution

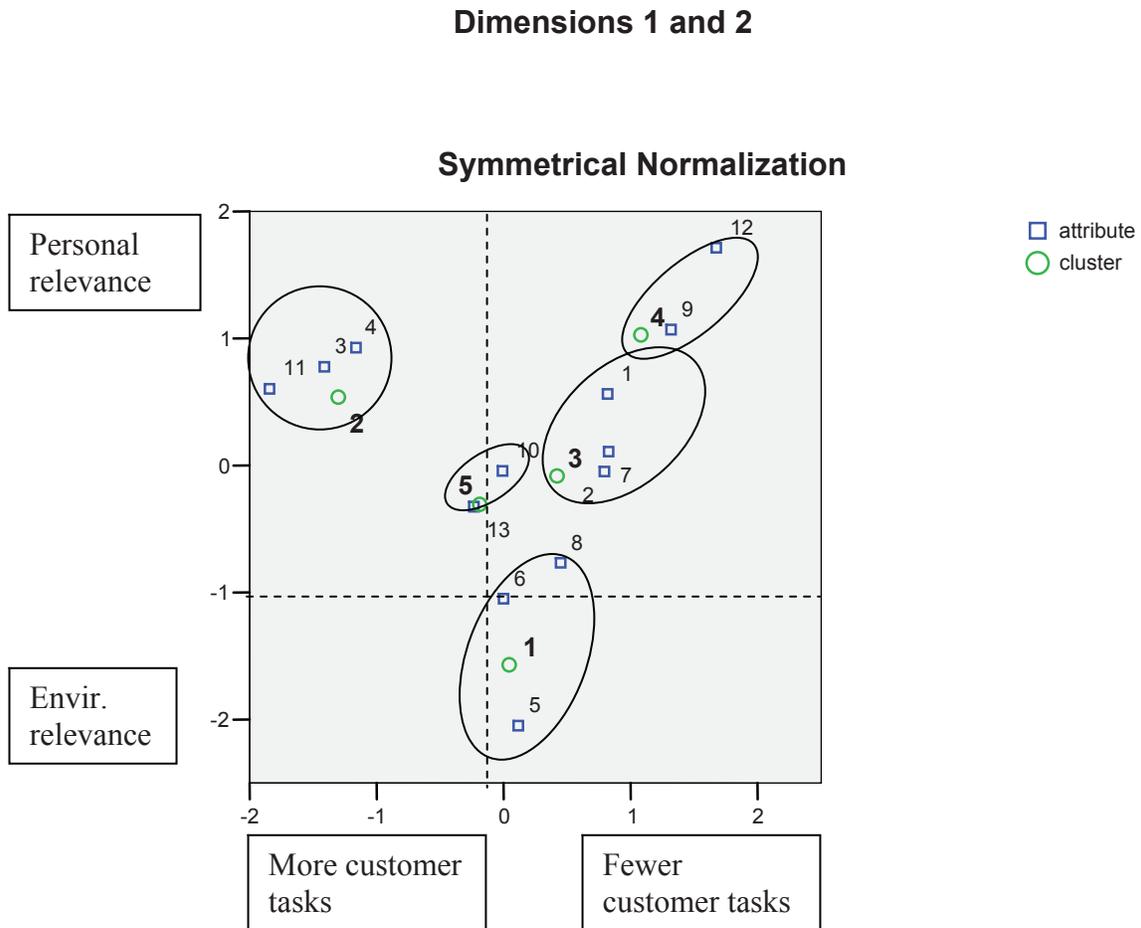
<i>Cluster</i>	<i>Number of Observations</i>
1	22
2	45
3	63
4	42
5	28

These clusters were then used in a correspondence analysis. Looking at "the principal inertia information", it was found that three dimensions explained 86.2% of the total variance (dim 1= 34.%, dim 2= 29.4% and dim 3= 22.8%).

The principal inertia is the weighted average of the Chi-squared distances from the centroid to the projections of the row profiles on the respective principal axis. It is an absolute measure of the dispersion of the row profiles in the direction of that axis. Each principal inertia can be decomposed into components due to each row profile (or column profile). Rows, which contribute highly to a principal axis, largely determine the orientation and the identity of the corresponding principal axis.

Analyzing the contribution of all clusters and attri-

Figure 4a. Biplot of corresponding analysis.



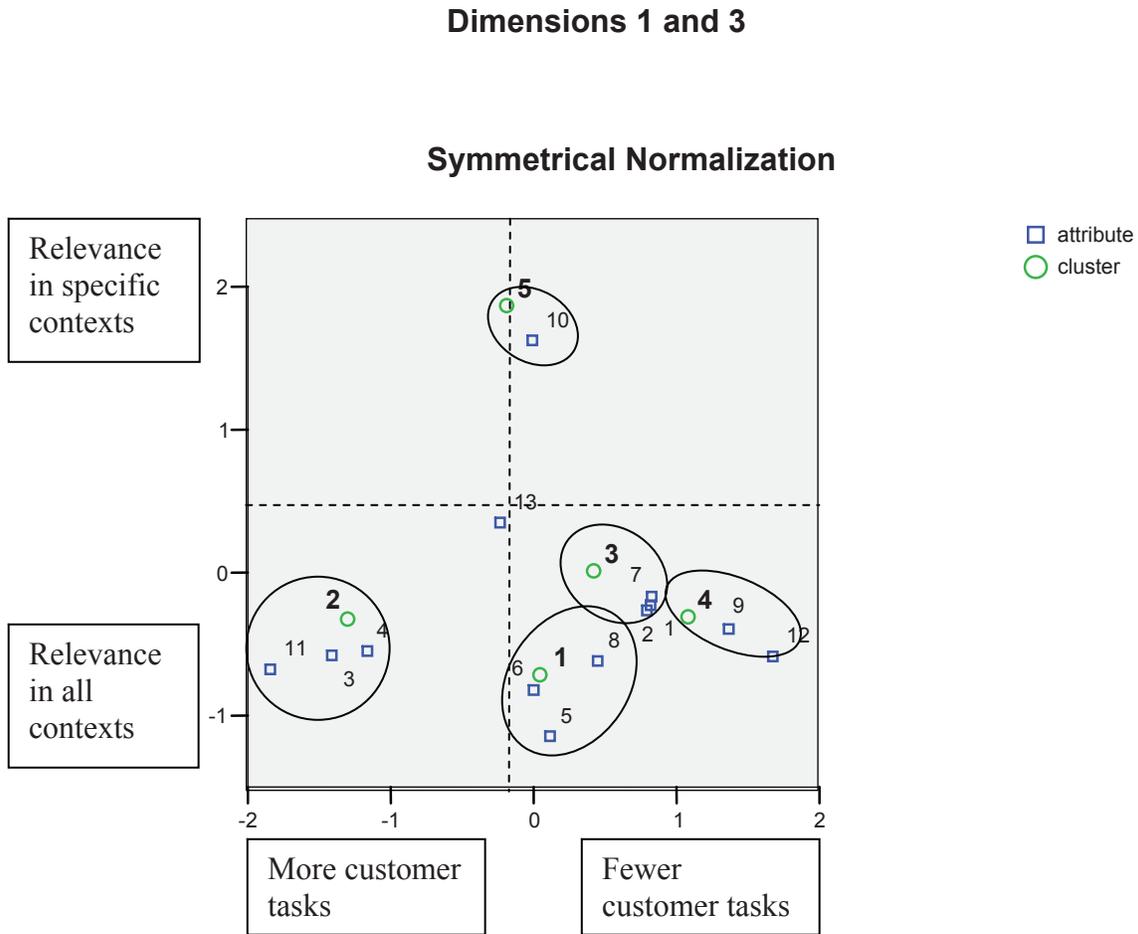
Attributes:

- Increase in:
1. Simplicity/usability
 2. Performance/capability (due to increased performance of existing functions or the creation of new ones)
 3. Fun
 4. Customization/segment adaptation
 5. Environmental friendliness (positive influence on society)

- Decrease in:
6. Customer costs of adoption
 7. Customer disadvantages (unwanted or undesired functions in all contexts)
 8. Customers costs of use
 9. Customer productivity/time
 10. Customer risks (unwanted or undesired functions in some contexts)

- Change in customer tasks:
11. More customer tasks
 12. Fewer or less complicated tasks
 13. No change in customer tasks

Figure 4b. Biplot 2 of corresponding analysis.



Attributes:

Improved:

1. Simplicity/usability
2. Performance/capability (due to increased performance of existing functions or the creation of new ones)
3. Fun
4. Customization/segment adaptation
5. Environmental friendliness (positive influence on society)

Reduced:

6. Customer adoption costs
7. Customer disadvantages (unwanted or undesired functions in all contexts)
8. Customers user costs
9. Customer productivity/time
10. Customer risks (unwanted or undesired functions in some contexts)

Change in customer tasks:

11. More customer tasks
12. Fewer or less complicated tasks
13. No change in customer tasks

tributes to the inertia of these dimensions, the following observations were made:

- Dimension 1 was mainly influenced by the task-related attributes and the benefits “customization” and “fun” (cluster 2 and 4 explained 89.8% of this dimension).
- Dimension 2 was mainly influenced by the “envi-

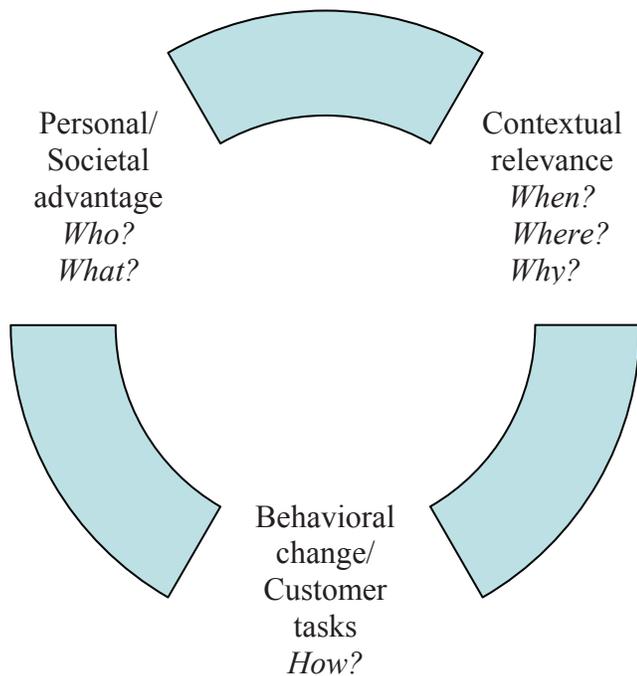


Figure 5. A customer value ideation approach.

ronmental friendliness” attribute (covered in cluster 1).

- Dimension 3 was mainly explained by the risk attribute (covered in cluster 5 and explaining 78.7% of this dimension).

The biplots visualize the five clusters and attributes related to these dimensions (see figures 4a and 4b, next two pages.):

In table 3 (next page) the five clusters are discussed in detail.

These empirical insights seem to confirm our theoretical findings that contextual relevance (in some versus all circumstances), behavioral changes and personal/environmental influence characterize to a large extent today’s innovation landscape.

These dimensions may be related to the 5W/1H question oriented ideation approach (see figure 5, below).

“Who” refers to the people involved as a result of the

value proposition: individual persons, different family members, the society, etc.

“What” refers to the advantage itself (benefit and/or cost drivers).

“When” refers to a specific stage of the customer experience cycle (purchase, delivery, use, etc.) or a moment within that stage (for example new moment of use).

“Where” refers to the location where the experience stage takes place.

“Why” refers to the scope of application (reasons for buying the new product).

“How” refers to the tasks to be performed by the people involved.

Interesting product ideas may result from a combination of all these dimensions. For instance, in case of the “Phone Languages” example, removing displacement for the customer (how ?) not only provides simplicity/more productivity to the customer (what?), but also allows increased customization (what ?). Moreover, the customer can decide “when” and “where” he wants the course by phone. Some innovations may induce changes in the people involved (who?). For instance, a bicycle with a back wheel that doubles, when the bicycle almost stops may be safe for children learning to ride a bike (removing the task of running for mom or dad).

Several dependencies between all these customer value dimensions may be created to induce new products. For instance, two types of dependencies may be created between the change of customer tasks (how dimension) and the benefits in terms of productivity/time (what dimension).

(a) A change of customer tasks may lead both to more simplicity and a time/productivity gain (two aspects of the what dimension). The following examples illustrate this:

- GoMobo is a firm dedicated to improving everyday life for on-the-go consumers through the innovative use of mobile technology. It develops new products allowing customers to pre-order food online or via text message.
- Degussa has developed a unique surface refinement technology called Top on Top. Surfaces treated with Top on Top are easy to clean and remain clean for months. The new technology significantly decreases the effort required to keep surfaces clean and reduces the amount of cleaning agent needed. It also makes surfaces highly dirt- and water-repellent. As a result, dirt no longer sticks stubbornly to the surface, while water and oil bead into droplets that can easily be wiped away. This reduces the time that has to be spent on cleaning.
- Mobile Notetaker is a device to capture natural

Table 3. Description and examples of clusters in cluster- and correspondence analysis.

<i>Clusters</i>	<i>Value Focus</i>	<i>Behavioral Change</i>
1	Cost advantage to society (environmental friendliness) and customer (adoption costs and costs of use)	No or limited change in number of customer tasks. E.g., eco-friendly diapers, energy-friendly window, washer using ozone (less water), water-saving showers, etc.
2	Fun or customization	Additional customer tasks. E.g., products customized by customer (T-shirts, jeans, etc.); small laboratory-box for doctors enabling them to perform tests on their own, etc.
3	Increased performance or reduction of disadvantages	No or limited change in number of customer tasks. E.g., navigation system integrated into mobile phone, washer that allows shoe washing as well, search engine allowing Chinese text interpretation using English key words, ear plugs for construction workers filtering traffic noise but not other noises, etc.
4	Increased customer productivity/simplicity	Fewer tasks or less complicated tasks. E.g., phone languages (language course by phone → no travel needed); smart pill box (warning when to take a pill → not necessary to remember); WashDryIron (washer/dryer/iron in one); color changing ink on egg (indicating when it is ready—not necessary to check time), etc.
5	Reduction of risks (unwanted properties/functions in specific customer contexts, etc.)	No or limited change in customer tasks. Steering or correctin bicycle (relevant in case of risky bicycle riding), water resistant mobile phone (relevant in some environments such as bathroom), mobile phone option allowing unsending of text message sent, car seat detecting when you fall asleep, etc.

handwriting from any surface, and store it for future use. Based on a revolutionary electronic pen that uses ordinary ink refill and writes on any paper, the PC NoteTaker stores handwritten notes, memos or drawings for easy upload to any computer at your convenience. Additionally, if Mobile Notetaker is connected to a computer, handwritten text and drawings are displayed directly on the computer screen. This saves time for the customer.

- The Mac & Cool Quick Cooling Dish begins cooling instantly without diluting the food. No more blowing on hot food is needed by the parent (saving time and people involved)

(b) Sometimes a change of customer tasks may lead to more simplicity for the customer, but not to a time/productivity gain.

- The Swedisch company Bokilur allows you to listen to audiobooks on your cell phone. No

more reading is necessary. It is simple, but not necessarily saves time.

- The N300 is a simple product that can assist to combat ear discomfort associated with flying in an otherwise normal ear.

It also should be noted that a change in tasks not necessarily has to be behavioral, but also may be cognitive in nature. The MD.2 pillbox, which is about the size of a coffee-maker, not only dispenses medications, but also has an audio feature that reminds patients when it's time to take their medication.

Lastly, the empirical study shows that attribute/function dependencies (as in the Goldenberg et al. studies) may have entirely different customer value implications.

For instance Design Barcode turns standard barcodes into appealing and engaging brand elements, using a shape for the barcode that corresponds to the product content. In this example a dependency is created between two attributes of the product: the packaging barcode and the con-

tent. The customer value is fun (what dimension).

Another example is Quooker that allows you to get boiling water straight from the tap (e.g. to drink your tea). It creates a dependency between the temperature of the water and the function (purposed). The customer value is a behavioral change in the way water is boiled (how dimension).

All these examples show that important customer value information may be lost if a product focused ideation approach (focusing on attributes and functions) is used.

Moreover product focused ideation approaches also have important limitations as they do not deal with the complementary product context of the customer. For instance, a touchbook enables a reader to touch the surface of a printed page and retrieve digital content on a computer. This idea could not have been generated if ideation was limited to creating attribute dependencies within the existing product (attributes of a printed page).

Conclusions

The cluster and correspondence analysis shows that value creation and innovating is no longer only about “what” you are offering to the customer (improvements of attributes and functions), but also about changes in the customer context (“when”, “where” and “why”) and the customer process (“how”).

Many studies on context effects deal with the relational properties of “attributes” across and within different alternatives. The insights in this paper indicate that a context is not only about attributes, but also about tasks and risks (relevance) experienced by the customer and about environmental implications.

Our findings are confirmed by the strategies of successful companies. A company such as Apple combines the three customer context related dimensions and operates along the continuum of each of these dimensions.

On one hand tasks are removed or made less complicated when new products are introduced (e.g. iPhone with multi-touch display and no other buttons). On the other hand more customizability options (inducing more tasks) are offered. In both cases, value is created. Moreover, different contexts in which a new product may be relevant are identified (e.g. context of phoning, gaming, etc.). Finally, environmental issues are dealt with, such as the needs for more connectivity and convergence of different products, environmental friendliness, etc.

An interesting question related to our insights is: “what is the value growth margin of a product or offering?”.

Studying the flexibility of the product to move further along each of the three contextual dimensions identified

in this study, may answer this question to a large extent.

As it is quite obvious that all contextual value dimensions are interrelated, making one move along one of these dimensions, may induce opportunities to make new moves along other dimensions. Therefore trade-offs and synergies between the “what”, “who”, “why”, “how”, “when” and “where” context should be analyzed in depth.

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Improvement Triad: Processes, Products, and Management Practices

Dave Nave

Abstract

Improving business performance occupies the attention of many executives. On their own, three common areas of focus for improvement—improving processes, product design, and management practices—provides for a good return on the investment. However, the solution is not one program or another. Each focus has a different scope of influence and a different time horizon for returns. When exploring these three areas for improvement together, what emerges is a better understanding of how they interact and work collectively for the betterment of the organization. Collaboration and communication between groups with special skills and interests is the start of a whole new level of improving business performance.

Keywords

improvement, management, value

Improvement Triad

Many business leaders search for ways to improve their organization through an internally focused improvement effort. Three general areas capture much of their attention. First is how a product or service is delivered; second is how the product or service is designed; and third is how management is practiced. Working together these three areas create an improvement triad.

Every organization must make a contribution to society in one form or another. Many businesses define their societal contribution as fulfill a customer's need, now and in the future; stay in business; and provide jobs. When done correctly an organization can succeed in the short term. However, long-term success requires a dedication to constantly scan the environment for new opportunities, predict future customer needs, and find new ways to provide products and services.

How does a company start making improvements? Intertwining product requirements, efficient processes, and human behavior into an approach for improvement is difficult. Popular thinking advocates two approaches for implementation inside the organization, Bottom-Up and Top-Down. Each approach has special commitments and

produce results at different speeds. Bottom-Up approach normally begins with improving production, creating quick results, both in the short-term financial health of the organization and to the operational efficiency. Financial returns can be verified relatively quickly and are quantifiable.

The caveat of focusing on the Bottom-up approach is that other inefficiencies in the organization remain hidden. Inefficiencies, that if improved, would provide greater financial returns.

Top-Down approach addresses management practices, the infrastructure of the organization, the very foundation created to support all efforts. Management practices address how people interact with each other, the system and environment. The Top-Down approach is a difficult route and the benefits take longer to become visible. However, the benefits are far greater. The scope of change is broad. The separation between cause and effect is vast. Visible effects are subtle. Correcting inconsistencies between policy and strategy is time consuming and sometimes gut wrenching. Adjusting behaviors to new practices takes time and practice.

Improving product or service design is one area not normally considered in the Top-Down, Bottom-Up discussion. Design is one area that provides a balance between effort and benefits. Improving design defines how to satisfy the customer's current needs differently from what is currently offered.

Let's explore the various considerations of improving production, design, and management practices in more detail.

Process Improvement

Efficiently providing products and services consists of an overwhelming number of factors. Requirements are imposed from multiple sources, each with their own needs and wants, and ramifications going far beyond the immediate area. As requirements are cascaded through the organization, the requirements are translated into actionable items. To the workforce, some are obvious and some are not.

Process Improvement methodologies are created to improve operational efficiency. Each provides a disciplined approach for improving how a product or service is pro-

duced and delivered. The primary technique is to expose incongruities and assumptions, then redirect the focus of dedicated professionals.

Once incongruities are exposed and understood, people inherently strive to correct them. No one deliberately creates unnecessary work or bad quality. Most processes are created with the best of intentions, focusing on performing the task at hand, with the resources at hand, in the environment where they exist. Over time, conditions change and the reasons for the original decisions are lost.

Looking at one methodology, Lean's objective is meeting the customer needs, at a specific time. The focus is exposing wasteful activities so they can be removed. 'Eliminating Waste' is the phrase used. Waste being defined as any activity that consumes resources without creating value.

Lean begins by identifying what activities create value in the product, from the standpoint of the customer. Value added activity is defined in practice by asking 'if the customer would be willing to pay for' that activity. Once various value added activities are identified, non-value added activities are minimized and/or eliminated where possible. Value added activities are sequenced and linked into what is called a *Value Stream*. Emphasis is placed on making the activities *Flow*, like a river. Efforts are turned to letting the customer *Pull* product or service through the process. Making the process responsive to providing what the customer wants, only when the customer needs it. Not before, not after. With new knowledge, the process is repeated indefinitely, striving towards *perfection*, or at least adopting the mindset of constantly reevaluating activities for improvement.

One of Lean's most powerful tools for exposing incongruities is described in popular literature as a 'Value Stream Map.' Also known by its more traditional name 'Material and Information Flow Map.' Similar in appearance to a standard process flow chart, a VSM shows the product flow and includes informa-

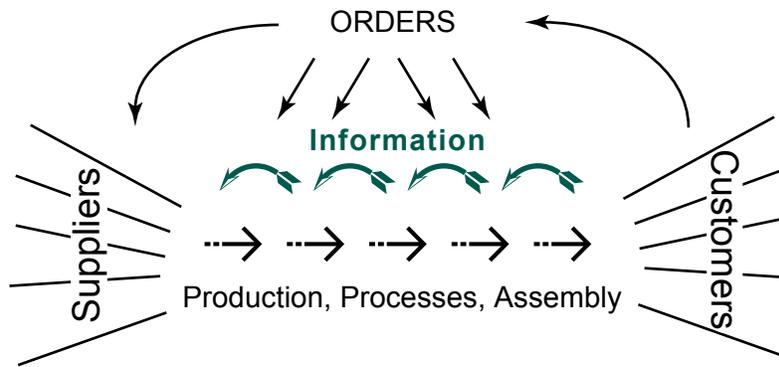


Figure 1, Value Stream Map

tion flow triggering each process. A Value Stream Map is created by starting from the customer end of the process, then following the process upstream to the raw material. From a map of an existing production system, Process Improvement ideas are generated. Lean uses many tools and techniques for implementing those new ideas.

There is a striking similarity between VSM and Dr. W. Edwards Deming's 'Production Viewed as a System' diagram.¹ Both display segments of knowledge, string them together in a coordinated effort to help managers and workers understand how elements work together. Apparently VSM has its roots in the 1950's work of Dr. Deming.

Other process improvement methodologies are available and they are known by many names. Most use a structured approach to understanding the existing conditions, generate improvement ideas, then implement changes. The scope of the project changes according to the needs of management or the problem at hand. Six Sigma focuses on a deep dive investigation in a tightly defined project, directed towards reducing variation. Theory of Constraints focuses on a shallow dive into the broader scope of improving throughput from raw material to finished goods. The choice of process improvement methodology is primarily based on management and workforce acceptance.

Each process improvement methodology looks at the product or service through their own respective theories and tools. However, their perspective may or may not satisfy the current or future needs of the customer. Many process improvement activities begin by assuming the product or service is designed in the most economical way to satisfy the needs of the customer.

They also assume the current product or service fulfills the functional requirements of the market and the customer. Various methodologies address product design issues after processes are defined, refined and behavior is understood. Generally product design changes are requested to facilitate efficient

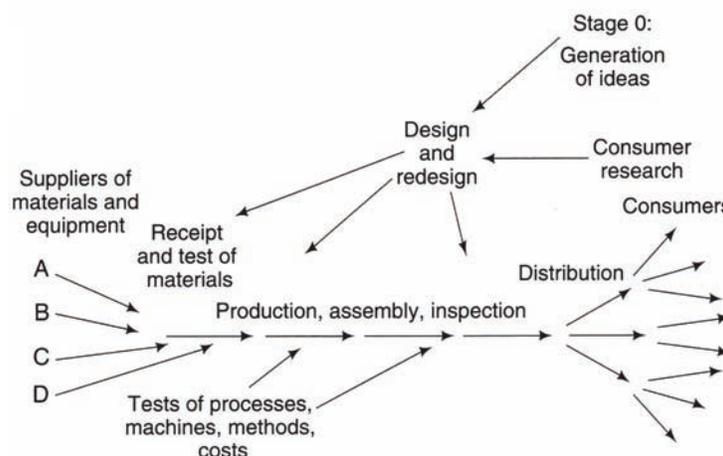


Figure 2, Dr. Deming's - Production viewed as a system

production.

Improving operational efficiencies increases productivity, which in turn, decreases operational costs. The time delay between process improvement and benefits is short, resulting in an improvement in the organization's bottom line very quickly. However, sustained financial gains may be fleeting, as the market is constantly changing. *A company could end up with the most efficiently produced product that nobody wants.*

Product Improvement

The design activity consumes five percent of the product cost, while it has a 70 percent influence on the final cost. On the other hand, material and labor costs can consume 65 percent of product costs, while only influencing the final cost by 25 percent. Where would you invest your capital and human resources to produce the largest return, improving the 25 percent or the 70 percent influence on product costs?

The underlying foundation of Value Methodology is to challenge the assumptions about how the product or service satisfies the needs of the customer. Customers need something done, they want an outcome. Customers don't want a feature, they want a function. After all, it is the function that creates a benefit for the customer.

Value Methodology has been evolving for the last 60 years as a way to remove 'unnecessary cost' from the product design before, during, and after the fact. This approach is slightly different than Lean. Many times Lean's 'eliminating waste' is subject to local definition, frequently carries emotional baggage or uses a limited perspective. The Value Methodology approach is emotionally neutral and is a result of a study from a cross-section of business functions.

Value Methodology transcends corporate cultures and uses language that goes past symptoms, to the heart of the business issue. This approach essentially separates INTENT from METHOD, creating clarity of thought, then builds a METHOD based on INTENT. Value Methodology studies bring marketing, finance, operation, design, customers and suppliers together to systematically explore how the product performs the function the customer needs. A particularly interesting part of this investigation is when costs are associated with functions. When everyone knows the cost of specific functions, they make informed choices about the configuration of the product or services. This comparison can also be used as an analysis of effective implementation.

Modern day Value Methodology originated at the General Electric Company during World War II as Value Analysis. Lawrence Miles, a GE engineer, was tasked to determine how to produce hardware for the war effort, despite shortages of key materials. He approached the problem by

identifying what intent the hardware had to perform, and then exploring alternative ways of providing those functions.

Lawrence Miles outlines a structured process that consists of defined steps called a 'job plan.' This 'job plan' builds on the foundation of identifying what the customer needs, as opposed to the producer's perception of what the customer wants. From the foundation of customer needs, a series of requirements are created and prioritized. His approach is based on a few deceptively simple questions: 1) What is it? 2) What does it do? 3) How much does that cost? 4) What is it worth? 5) What else will do that? 6) What does that cost? Very easy questions to ask, and many people are quick to answer. However, bring a group of people together from inside and outside the organization to answer these questions, you quickly find a vast array of answers. Almost as many answers as people, each from a different perspective, each with different viewpoints and preconceived ideas.

To Lawrence Miles' surprise, his alternative solutions often achieved the required functions with lower cost and/or higher performance. His approach was so successful that the US Navy adopted his methodology and changed the name to Value Engineering. Since then, Value Engineering has spread to industries and governments throughout the world.

In the 1960s, Charles Bytheway developed a graphical method of analyzing the dependencies between sequential functions. A structured modeling approach that separates 'what' must be done (intent) from 'how' we choose to do it (architecture). With this method, he was able to identify a complete, non-redundant set of functions. Creating a diagram to quickly recognize missing functions, redundant functions, and areas of low value; and for mapping functions to organization's processes, products, events, and other systems. His Function Analysis System Technique (FAST) has become a mainstay of Value Engineering.

In the early 1980s, J. J. Kaufman expanded the basic concepts of both these men's work, broadening the application of Value Engineering beyond the application of physical sciences into the area of resolving business problems and capturing business opportunities. He created Value Management—an organized effort directed at analyzing goods and services to achieve necessary functions and essential characteristics in the most profitable manner. Value Management determines cost generation and evaluates a range of alternatives including new concepts, reconfiguration, eliminating or combining items, and process or procedure changes. These elements bring marketing, engineering and manufacturing together to "take deliberate action to improve cost effectiveness."

Let's discuss 'Value' in more depth. We are talking about Economic Value, not political value, not social value, not judicial values, etc. Lean defines value as satisfying the customer's current need at the right time. Value Management defines value in three elements: 1) Use or performance value—how well does it work, 2) Worth value—what is the purchaser willing to pay for the product's function, and 3) Esteem Value—desire to own, e.g. a brand name. The ultimate value can be calculated as Use, Worth, and Esteem; divided by the price paid. This definition is more difficult to define, however, it provides a robust description of value for the purpose of product design. Lean's definition, while also challenging to define, is activity based and in a language more suited for the production environment.

Management Practices Improvement

Human activities and efforts in any organization are based upon management practices. Governing how people interact within the organization, as well as, how people interact between the organization and the rest of the world. The practices may be consciously created and based on theory, or may have simply emerged as the organization grew and matured.

Management's job in the area of improvement is to create and facilitate an environment for learning and cooperation. One area to start is to remove policies and barriers that inhibit people from doing a good job. At the same time, encourage communication between functional areas and different levels of the organization. How can management accomplish this? Several issues come to mind.

Remove or minimize any ranking, rating, merit, incentive pay, or pay for performance programs. These programs institutionalize internal competition. *The organization should not be in competition with itself.* Great losses arise from selfish competition between departments and individuals. The organization is a system, working together towards a common purpose. It must be managed as a system, complete with managing the interactions and grey areas between components.

Overcome the temptations to manage based on results or relying solely on numbers for decisions. Do not confuse coincidence with cause and effect. Managing by outcome does not improve anything. The same system created both the positive and negative outcomes. Only by improving the system can long-term, sustainable improvement happen.

A system is a network of interdependent components working together to accomplish the aim of the system. Leaders must recognize and manage interdependencies, aligning efforts towards the common aim. How is this accomplished? By removing barriers, resolving conflicts, encouraging cooperation and communication between components.

Every component of a system has an obligation to that system. That obligation is to contribute its best to the aim of the system. Not to maximize its own production, profit, sales, or any other competitive measure, at the expense of the organization as a whole. When a component makes recommendations for improvement, show how the recommendation contributes towards the aim of the organization. Identify how other components are affected, risks, tangible and intangible benefits, and a plan. Possibly make recommendations for several scenarios. After all, a component may not be aware of all the factors involved with the environment in which it exists. An improvement may provide intangible benefits that outweigh strict dollar savings.

Keep an eye on long-term solutions and long-term efforts as well as changes in technology and markets. Of course take care of the emergencies and fires that arise. However, only long-term solutions will keep the organization alive in the future. Keep reminding people of the larger purpose of the organization and the role of improvement in the success of the organization.

Another aspect of management's obligation to improvement is to encourage the exploration of data and theory for the purpose of creating knowledge. Without knowledge, any change is just a guess. Frequently, guessing just makes things worse. Data, information and knowledge are not the same. Data is just that, data. Measurements and observation counts are two examples. When data is placed in a context, information is created. Understanding how data is classified and interpreted based on the concepts in which it was created, along with how the data is used for action, are just a few factors of converting data and information into knowledge.

People are different. To help create an atmosphere of learning, explore how people interact with each other, with the circumstances of their environment, and with the system. People learn in different ways. Some learn by reading, others by listening, and still others by watching pictures,

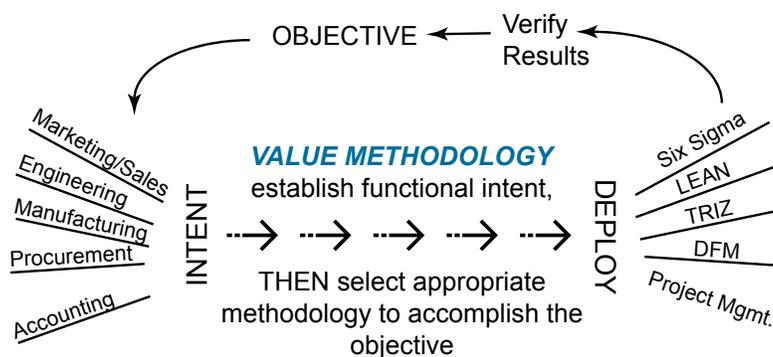


Figure 3, Value Methodology as a system

movies, or someone else. Don't be trapped by the idea that people learn by doing. People don't learn only by doing, despite what is advocated in popular literature.

People are motivated by those who inspire them, not through coercion. Rewards and incentives have a negative effect on learning. People will only fulfill the requirements in order to obtain the incentive. Animals are trained by using rewards. People learn so they can improve their ability to contribute and make a difference, to the group, company, or society.

Marya Mannes said "Generosity with strings is not generosity; it is a deal." Certainly show an appreciation for efforts and contributions. However, do not make that appreciation a reward or incentive. Telling people if they do something, then they will receive an incentive, will only demoralize them.

In addition to managing the system, leaders will have to manage changes in the current system, as well as plan for changes in future systems. Organizational growth and complexity are neverending. Anticipating future changes may lead to redefinition in the boundaries of system and components. Preparing for these changes requires imagination about the possibilities.

Creating an Improvement Triad

Improving the organization as a whole requires that processes, products, and management practices work together. Everybody doing their best is not sufficient. Functional areas of a system must be aware of how their actions impact other groups and the entire system. Investigate to understand how actions of each group will benefit the whole, and identify the dangers of how their actions introduce risks to the whole. Some groups may have to accept less than optimal performance of their functional area in order for the entire system to improve.

Selecting where to start is not a question of one area or the other. All three areas are codependent on each other. No group exists in isolation. Every organization is a system.

When improvement is begun in any single area, the first issues addressed are usually the issues that can be corrected by the local workforce. However, as these immediate and local issues are corrected, new issues become visible. Conflicts arise as improvement efforts start to influence other areas. Especially, when the unbridled enthusiasm of one area, intrudes into another area, and the reasons for the change are unclear. This conflict produces several adverse effects. First, it negatively affects the morale of people and organizations. Second, conflict leads to reduced performance of other groups in the system.

People are not against change, they are against *being* changed. Functional work groups are not receptive to being

told they must change. People need to understand the need for change from their perspective. Communication and collaboration are effective ways to overcome resistance. Management practices must provide an environment where people are given a voice in how change is going to happen and share knowledge about each other's improvement projects. During all communication use common language easily understood by most people. Do not become trapped in the exclusionary language of jargon.

The organization must learn individually and collectively. Only through cooperation and collaboration will collective learning take place. Collaboration in pairs is an interim step. Eventually, production, product design, and management practices will need to work together.

Conclusion

While process improvement will produce results quickly, those results are transient and often only include the short-term future. Product improvement can produce great benefits. However, those results take longer to realize. Improving management practices produces the greatest results, however those results may take years to realize, are the most difficult to accomplish, and many of the results may be indirect. After all, behavior is a hard thing to change, in ones' self and as a group.

Caution: there is a popular belief by many advocates that people outside the area will 'see the light' and change if you show them the results of improvement. This is a myth. Don't believe everyone will automatically accept and adopt any methodology once it is 'proven' through improved performance. The system will adapt, nothing more. And even then, the system will only adapt enough to alleviate the pain that your effort is causing.

Improvement of an organization is not a matter of selecting one path or another, but of balancing; efficient production, effective product design, and humane management practices. Each area has unique characteristics, which on their own would make great contributions to an organization. However, when working together, these three areas create a whole new level of performance.

One way to balance production, product design, and management practices is to support all three be related, however keep the projects in close communication with each other. As the learning cycle revolves and grows, the efforts will strengthen themselves. As communication increases between each area, interdependencies become visible and a bond is created.

Don't be afraid of making mistakes. They will happen. And don't be afraid of having to rework a previous improvement effort when new knowledge becomes available, or when one effort is influenced by another effort, for that hap-

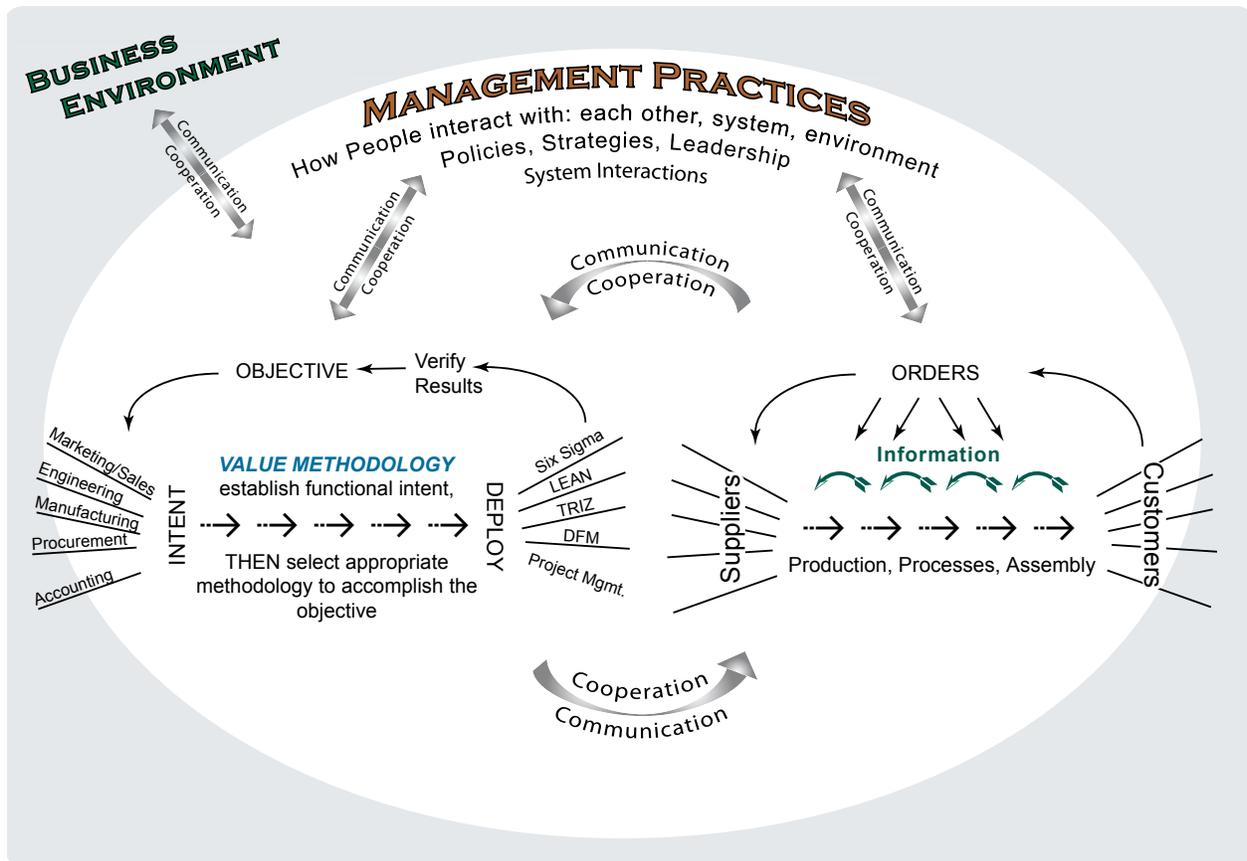


Figure 4, Improvement Triad

pens too. Example: when a process is redesigned because of a product change, or when a product is redesigned because of a process improvement. Keep the aim of the organization in view. Realize every improvement is another step in that direction.

Many people are concerned about how improvement projects are funded. The first few pilot projects may require new funding, however the amount is normally small and the risks low. As projects evolve and grow, some of the money saved from previous process improvement projects can be used to pay for efforts in areas where results take a while to become visible.

In one state government, the Governor set up an agreement with various state agencies, where half of the money each agency saved through improvement projects remained in the control of the local agency. However, after three years, the annual savings were absorbed into the agencies baseline budget. The caveat was that the money could only be spent on new improvement projects or for betterment of the local constituents. All the state agencies agreed to spend their savings on computers for the local school systems. After a couple of years, every school in the state had computers and internet access. Even a two-room school in a very remote part of the state. This agreement gave people

a voice in how they would change their work environment and how the gains would be shared. Improving the local schools also gave the people something tangible to work towards that had special meaning to them.

Imagine what a similar agreement would look like in your organization.

Changing is hard work, with many frustrations and setbacks. However, the rewards are even greater.

It's a brave new world! Let us work together, communicate, collaborate, and most importantly—have fun!

ENDNOTES

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