SIX SIGMA

Market Focused, Value Driven—It's All About Gaps

by **Eric Reidenbach and Reginald Goeke**

W hen Six Sigma is applied to increasing an organization's market share or top-line revenue, as opposed to reducing costs, it is all about gaps—value gaps.

Value is a leading indicator of market share and

In 50 Words Or Less

- Six Sigma can be used to increase revenue and market share.

- Voice of the market (VOM) is more important than voice of the customer in Six Sigma projects.

- Analyzing VOM feedback can identify value gaps—the areas in which projects should be focused.

profitability.[1] In fact, organizations with a sustainable value advantage (a positive value gap between themselves and a competitor) also are likely to be market share and profitability leaders. Conversely, organizations that have no value advantage, or worse, are value laggards, surely will be also-rans from a market performance standpoint.

Market focused, value driven Six Sigma (MFVDSS) is a tool organizations can use to extend their value leadership. Value laggards can use MFVDSS to close the gap between themselves and the value leader, thus increasing their market share and profitability. Both widening and closing a value gap require changing the way the organization creates and delivers value. This means critical value streams and their constituent processes must be changed. But which value streams and processes? Who should identify them?

The answer is simple—the market. And, because value gaps among competitors are defined by customers of all competing organizations, it is the voice of the market (VOM)—not just the voice of a single organization's customers—that must be measured, understood and used to identify the value gaps and the underlying processes that produced them.

When Six Sigma is used for this purpose, it becomes a process of understanding the nature of the gaps, prioritizing their importance and linking them to specific organizational processes. This is the way VOM directs the organization's Six Sigma focus by eliminating guesswork and basing it on a solid, empirical, market based approach instead.

Understanding Value Gaps

Value gaps have three potential sources: quality, price or both. Market ratings on the various aspects of quality and price of competing organizations identify differences in the performance of these organizations, which in turn identify value gaps. Each organization has a unique value proposition based on market perceptions of its components of value, namely quality and price.

Figure 1 shows the competitive value propositions of several manufacturers of tractors for the agricultural market. The two main components of value are quality ratings (customer quality index, or CQI), plotted on the vertical axis, and price ratings, plotted on the horizontal axis. These form the basis of the competitive value matrix. The ratings are results of customer surveys focusing on each of the competing businesses—in other words, the
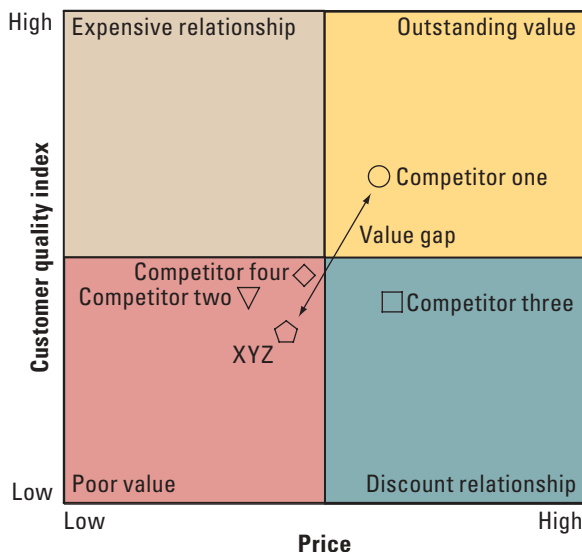
VOM. The quadrants are formed by the intersection of market means for quality and price.

Competitor one falls in the outstanding value quadrant, based on market perceptions that the business is offering superior quality at a highly satisfying (competitive, fair, acceptable) price and is the market share leader. The better an organization's performance on both quality and price, the further that organization will be positioned to the upper right of the matrix, representing outstanding value.

Competitors two, four and XYZ are in the poor value quadrant, based on below average scores on quality and price. Poor quality at an unsatisfactory price is the very definition of poor value. Competitor three is in the discount relationship quadrant because the market assesses its quality as below average, which places it below the market mean on quality. Competitor three's price satisfaction ratings are above average, placing it to the right of the market mean on price. In other words, the quality of competitor three's product isn't very good, but the organization isn't perceived as charging too much for it.

Figure 1 reveals the value gaps among the competitors. Notice the gap between XYZ and competitor one. The challenge facing XYZ is to close this value gap and, in so doing, increase its market share. Conversely, competitor one would want to increase the gap it enjoys over its closest rival, competitor four. This is where MFVDSS comes in.

Basis for the Value Gap

The basis for the competitive value matrix is the value model shown in Figure 2. It is developed from the customer surveys evaluating each of the major competitors. Accordingly, it is a market based model, not specific to any individual organization.

This is an important consideration because, were the model developed solely from ratings by customers of only one company, it would be a distorted model of market value. Such a voice of the customer based model would not account for the value definition from customers leaving that company, nor would it account for the value definition from customers doing business with competitors. Accordingly, such a model would not be very useful for customer retention or customer acquisition, the two criteria for increases in market share.

It's also important to note this is an empirically

FIGURE 1 Competitive Value Matrix: Agricultural Tractors

generated model and is unique to the product (tractors) and market (agriculture) from which the data were collected. Models generated by survey data from other products and markets will differ from this one, and it is this focus that makes the VOM regarding value so powerful in generating focused Six Sigma projects.
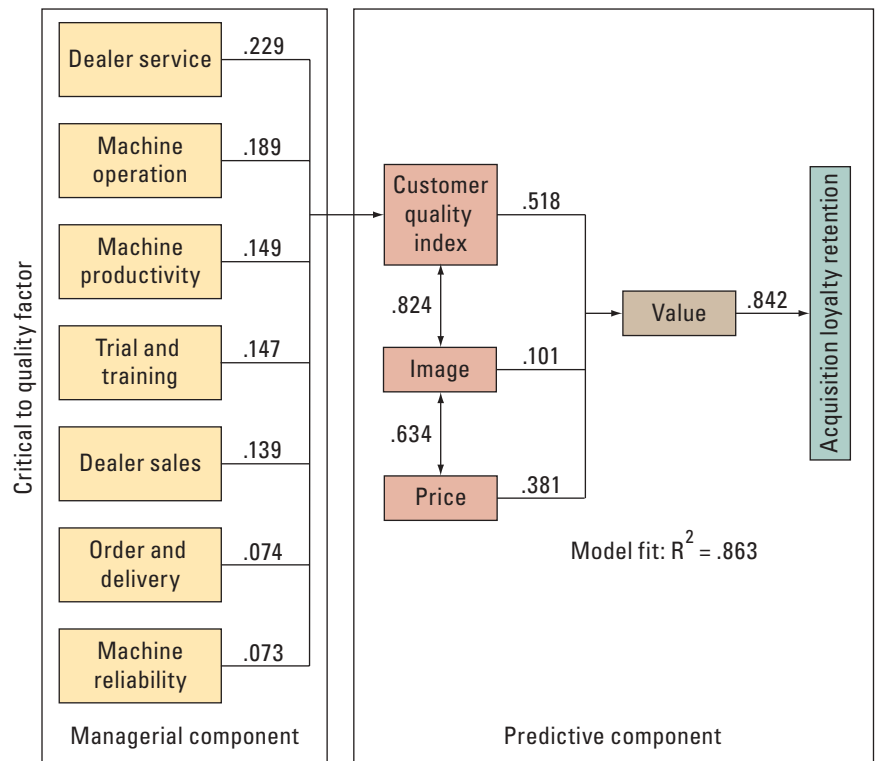
There are two components to the value model: predictive and managerial. In the predictive component, there are three value drivers: quality and price, as mentioned before, plus image. The numbers adjacent to each value driver are normalized beta weights from a regression analysis and indicate the relative importance of each driver when defining value. In this case, quality is most important, followed by price and image. The model defines the trade-off between the two major value drivers—quality and price.

Quality is more important in this model, leading to the conclusion that increases in value will come primarily from enhancements in quality rather than decreases in price. Quality and price impact value perceptions both directly and indirectly. The direct impact of each is supplemented by an indirect impact on value through image. This indirect impact is reflected in the correlation between quality and image and the correlation between price and image.

In other words, if an organization improves the quality of its product, the improvement will have not only a direct, positive impact on market perceived value but also on value through a related improvement in the organization's image.

Figure 2's market value model is robust, as evidenced by an R^2 of .863 (maximum value of R^2 = 1.00). The R^2 statistic is another output from a regression analysis, indicating the extent to which the predictor variables (quality, image, price) explain changes in the variable of interest (value). An R^2 of .863 indicates approximately 86% of what customers in this market mean by value is captured

FIGURE 2 Competitive Value Model for Agricultural Tractors

Critical to quality factor

Dealer service .229
Machine operation .189
Machine productivity .149
Trial and training .147
Dealer sales .139
Order and delivery .074
Machine reliability .073

Managerial component

Customer quality index .518
.824
Image .101
.634
Price .381

Value .842

Acquisition loyalty retention

Model fit: R^2 = .863

Predictive component

in the components of quality, image and price.

This model also indicates value is a strong predictor of loyalty (R^2 = .842). In other words, customers who gave their tractor supplier high marks on value also reported they would be more willing to recommend the product to others, repurchase the same brand, purchase complementary tractor attachments or other products from the same local dealer and be less willing to switch to a competitor in the face of discounts.

Because an organization can manage the components of value, it can also better retain its own customers while winning less loyal customers from competitors.

Managerial Component

This brings us to the managerial component of the value model, the component most critical to Six Sigma practitioners. Each of the quality components listed on the left side of the model in Figure 2 is an individual critical to quality (CTQ) factor as

defined and ranked through the VOM survey. These CTQs form the customer quality index.

Each CTQ comprises more detailed performance criteria, which were rated by customers of the five tractor suppliers. These performance ratings identified and categorized each of the CTQs and identified their relative importance as drivers of quality. As before, the number to the right of each CTQ was produced by a regression analysis, and the CTQs are listed in descending order of importance. Dealer service is the most important driver of quality, followed by machine operation and machine productivity.

An important point is that neither value nor quality at the point of production necessarily translates to value or quality at the point of consumption. This fundamental premise requires an understanding that value and quality include not only product factors (machine operation, productivity and reliability), but also distribution factors (dealer service, trial and training, dealer sales, and order and delivery) that impact market perceptions of value at the point of consumption.

The entire value stream from point of production to point of consumption must be modeled to truly understand the various value and quality factors.

Performance ratings for each competitor on the CTQs are critical for understanding how to close the gap between XYZ and competitor one. Table 1 shows these mean scores from the market survey (1 = poor performance, 10 = excellent performance).

XYZ clearly has significant disadvantages on

each value driver as well as on all CTQ factors relative to competitor one. Each of these differences in performance is statistically significant at a 95% confidence level and accounts for the overall value gap between the two competitors.

Identifying CTQ Gap Importance

Which CTQ gaps will lead to the greatest positive change in value? Which should be the focus of Six Sigma deployment? The relative importance of CTQ gaps is a function of two elements: the difference in the scores between two competitors and the relative importance of the individual CTQ factor. Table 2 accounts for these critical elements.

The CTQ factors in the first column are taken directly from the competitive value model. Their relative importance is indicated in column two, again taken directly from the value model. Columns three through seven show CTQ scores for each competitor. Column eight shows the value gap between XYZ and competitor one (the target). Gap importance—importance multiplied by the value gap—is shown in the final column.

The higher the absolute value of the gap importance score, the more crucial it is in closing the value gap between the two competitors. In this case, dealer service will have the greatest impact on the value gap, followed by trial and training and machine operation.

Identifying VPC Gap Importance

There is yet another level of gap analysis necessary to identify where a Six Sigma initiative should be focused—the value performance criteria (VPC) level. VPCs are the individual attributes (questionnaire items) that lead to each of the CTQ factors.

Prior to development of the value model, the entire list of individual attributes is analyzed with factor analysis, a statistical tool that identifies groups of attributes that have something in common. Grouping attributes in this way is necessary to identify CTQ factors, but the individual VPCs add a greater level of resolution, thus providing a powerful directive influence to the CTQ analysis.

TABLE 1 **Competitive Critical to Quality Scores**

	XYZ	Competitor one	Competitor two	Competitor three	Competitor four
Customer quality index	8.66	9.24	8.81	8.78	8.87
Dealer service	8.20	9.08	8.80	8.66	8.91
Machine operation	8.73	9.27	8.74	8.62	8.76
Machine productivity	9.18	9.64	9.06	9.33	9.34
Trial and training	7.93	8.96	8.37	8.34	8.20
Dealer sales	8.72	9.31	8.94	8.75	9.15
Order and delivery	8.89	9.34	8.95	9.16	8.85
Machine reliability	8.71	9.20	8.99	9.01	8.93
Price	8.65	8.97	8.52	9.01	8.17
Image	8.88	9.49	8.84	8.91	9.11

XYZ advantage	Parity	XYZ disadvantage

TABLE 2   Critical to Quality (CTQ) Gaps and Gap Importance

CTQ factor	Importance	XYZ	Competitor one (target)	Competitor two	Competitor three	Competitor four	Value gap	Gap importance (absolute values)
Dealer service	0.229	8.20	9.08	8.80	8.66	8.91	-0.88	0.202
Machine operation	0.189	8.73	9.27	8.74	8.62	8.76	-0.54	0.102
Machine productivity	0.149	9.18	9.64	9.06	9.33	9.34	-0.46	0.069
Trial and training	0.147	7.93	8.96	8.37	8.34	8.20	-1.03	0.151
Dealer sales	0.139	8.72	9.31	8.94	8.75	9.15	-0.59	0.082
Order and delivery	0.074	8.89	9.34	8.95	9.16	8.85	-0.45	0.033
Machine reliability	0.073	8.71	9.20	8.99	9.01	8.93	-0.49	0.036

For example, Table 2 shows dealer service is the CTQ factor most important to XYZ's value enhancement, but dealer service can mean several things. Ask anyone in an organization what dealer service means, and you will likely get various answers. The individual VPCs that make up dealer service give an in-depth understanding of how the market defines it, eliminating the need for speculation. The VPCs are shown in Table 3 (p. 42).

The second column in Table 3 identifies the relative importance of each VPC to dealer service. Two statistical methods can provide this information:

1. The factor analysis described earlier. Each VPC is accompanied by a correlation coefficient, known as a factor loading, which indicates the strength of the relationship between the VPC and the resulting CTQ.
2. Simple calculation of the correlation between the VPC and the CTQ.

The latter approach was used for Table 3. Columns four through eight show the mean survey scores for each VPC (1 = poor performance, 10 = excellent performance). Column nine identifies the value gap between the organization and its target. The final column is the product of the VPC performance difference and its importance. This identifies the VPC gap importance.

Linking Gaps to Processes

Gap closure or enhancement comes from changing the way the organization delivers value to the market. Organizations consist of value streams, comprehensive sets of activities and communication that create and deliver value to customers. Value streams begin with a customer need for a product or service and end with that customer's belief he or she has received something of value. Some organizations might have only one value stream; others might be made up of multiple ones.

The organization's competitive value proposition (see Figure 1, p. 38) is a function of how well these value streams and their constituent processes and functions operate. XYZ's value streams need a significant overhaul, judging by its CTQ and VPC scores. By contrast, competitor one, to sustain its value advantage, should leverage its strengths regarding repair/service, finding ways to make this value stream even more effective.

This is where Six Sigma can be a powerful strategic tool, focusing on how to improve the organization's competitive value proposition and market share. To do so requires linking the CTQs and their VPCs to individual business processes. This step is shown in Table 4 (p. 43).

Because so many of the dealer service VPCs involve service and repair, it is obvious this is the value stream that should be under scrutiny, as opposed to a parts delivery or equipment delivery value stream. A cross functional team, led by a Six Sigma Black Belt (BB), decomposed the service/repair value stream into its constituent processes, shown in the first column.

The individual VPCs are shown across the top of the matrix above their specific gap importance scores, taken from Table 3. The team determined the importance of each process on the outcome VPC score. No impact was scored a zero, low impact a three, moderate impact a six, and high impact a nine, but other scoring approaches can be used.

TABLE 3 Value Performance Criteria (VPC) Importance: Dealer Service

Driver	VPC importance	VPC	XYZ	Competitor one	Competitor two	Competitor three	Competitor four	Value gap	Importance (absolute values)
Dealer service	0.808	Diagnostic skills of field service people	8.62	8.66	8.79	8.96	8.85	-0.04	0.03
	0.709	Product knowledge of dealer service people	8.63	9.23	9.07	8.79	8.95	-0.60	0.47
	0.753	Willingness to keep you informed of repair	8.35	8.91	8.68	8.19	8.45	-0.56	0.42
	0.805	Capacity to handle repair problems	8.59	9.07	8.82	9.16	8.76	-0.48	0.39
	0.653	Courtesy of dealer service personnel	9.09	9.57	9.10	8.63	9.48	-0.48	0.31
	0.798	Technical knowledge of dealer service personnel	8.45	9.14	8.97	8.84	8.87	-0.69	0.55
	0.654	Ability to get needed parts quickly	8.61	9.25	8.71	8.53	8.79	-0.64	0.42
	0.724	Ability of service people to understand your needs	8.54	9.41	8.76	9.00	9.11	-0.87	0.63
	0.750	Ability of service people to answer your questions	8.55	9.38	8.78	8.81	8.97	-0.83	0.62
	0.683	Dealer responsiveness in solving repair problems	8.65	9.05	8.51	8.22	8.97	-0.40	0.27
	0.656	Dealer problems solving ability	8.68	8.95	8.59	8.64	8.52	-0.27	0.18
	0.800	Ability of dealer service people to do repair	8.28	8.83	8.52	8.77	8.73	-0.55	0.44
	0.788	Ability to complete repairs when promised	8.75	8.88	8.86	8.57	8.95	-0.13	0.10
	0.678	Technical knowledge of dealer sales personnel	8.68	8.99	8.89	8.92	9.07	-0.31	0.21
	0.588	Dealer performance on warranty claims	8.68	8.98	9.08	8.53	9.03	-0.30	0.18
	0.688	Response time for dealer service	8.51	8.85	8.74	8.12	8.88	-0.34	0.23
	0.812	Quality of shop repairs	8.50	9.05	8.64	8.72	8.99	-0.55	0.45
	0.767	Dealer service responsiveness	8.57	9.21	8.94	8.49	8.96	-0.64	0.49

Whatever approach is adopted, it must provide an evaluation of the impact the process has on each of the VPCs. The VPCs represent the criteria the market uses to evaluate the effectiveness of the organization's value delivery. In other words, VPCs are the outcomes resulting from the x process inputs.

The final column of Table 4 contains the summated cross products of each process and VPC.

The higher the importance score, the greater the impact a process exerts on the CTQ factor, dealer service. Thus, the repair process (43.44) has the greatest impact on dealer service, followed by scheduling (41.46) and inspection/diagnosis (36.51). If XYZ is to close the value gap between itself and competitor one, it must focus its Six Sigma initiatives on one or more of these processes.

TABLE 4 Repair/ Service Critical to Quality/Process Matrix

Repair value stream	Diagnostic skills of field service people	Product knowledge of dealer service people	Willingness to keep you informed of repair	Capacity to handle repair problems	Courtesy of service personnel	Technical knowledge of dealer service personnel	Ability to get needed parts quickly	Ability of service people to understand your needs	Ability of service people to answer your questions	Dealer responsiveness in solving repair problems	Dealer problem solving ability	Ability of service people to do repair	Ability to complete repairs when promised	Technical knowledge of dealer sales people	Dealer performance on warranty claims	Response time for dealer service	Quality of shop repairs	Dealer service responsiveness	Importance
	0.03	0.47	0.42	0.39	0.31	0.55	0.42	0.63	0.62	0.27	0.18	0.44	0.10	0.21	0.12	0.23	0.45	0.49	
Inquiry	0	6	3	3	9	6	3	9	9	6	9	3	6	6	0	6	3	6	35.94
Scheduling	3	6	3	9	6	6	9	9	6	9	6	6	9	6	0	6	3	9	41.46
Inspection/diagnosis	9	9	6	3	6	9	3	6	6	6	9	3	6	9	6	3	3	6	36.51
Repair	9	9	6	6	3	9	6	6	6	6	6	9	9	9	3	6	9	6	43.44
Parts supply	3	3	6	6	3	0	9	3	3	6	3	6	9	0	0	6	3	6	26.19
Transport	0	0	3	3	6	3	0	3	3	3	3	0	6	3	0	6	3	6	17.94
Warranty	3	3	6	0	6	3	0	6	3	6	6	0	3	0	3	9	0	0	19.05
Credit checking	0	0	3	0	6	0	6	6	3	6	6	0	3	0	0	3	0	3	16.44
Parts crediting	0	3	0	3	0	3	6	0	0	3	0	3	3	3	6	3	0	3	12.69
Invoicing	0	3	3	3	3	3	0	3	3	3	0	0	0	3	3	0	0	0	11.97

Mapping the Processes

The BB led team then constructed the initial value map, shown in Figure 3 (p. 44). It provides the skeleton connecting all processes across the dealer service value stream and is too complex to be communicated here. The point of Figure 3, however, is that the analysis generated in the CTQ/ process matrix enables the team to focus more detailed mapping activity on the three processes identified as having the greatest impact on value.

This detailed, focused mapping activity will reveal problem areas and opportunities to conduct Six Sigma projects that will make the value stream more effective and less costly.

Linking the CTQ factor and its constituent VPCs to key processes in the value stream makes the mapping activity more effective and efficient. It's more effective because the team is focused on the right processes and mapping them in sufficient detail to uncover root causes. It's more efficient because the team is not wasting time mapping processes that contribute relatively little to value creation and delivery.

Market Focused, Value Driven

In a recent survey of companies using Six Sigma, 36% of respondents indicated their company's initial motivation for Six Sigma implementation was to reduce costs. The remaining 64% said their motivation was either to improve quality, better manage the business, respond to competitor pressure or design and introduce new products as a way to grow revenue.[2]

Clearly, the focus of the majority of enterprises was directed externally and involved, if done properly, some sort of customer or market information. Add to this another pertinent finding: The aspect of Six Sigma implementation that presented the greatest challenge was selecting the right project. These two results indicate the need for an MFVDSS initiative—one that uses VOM to make the enterprise's value streams more responsive to those they are designed to serve.

This initiative will enable the enterprise to improve quality, manage the business, respond to competitor pressure and design and introduce new products, all with a greater probability of enhanced market performance. Using the VOM's definitions of value will raise the application of Six Sigma tools to a new level—one that results in substantial revenue and market share gains and identifies the right costs to

FIGURE 3 Targeted Process Analysis

Diagnosis

Scheduling

Repair process
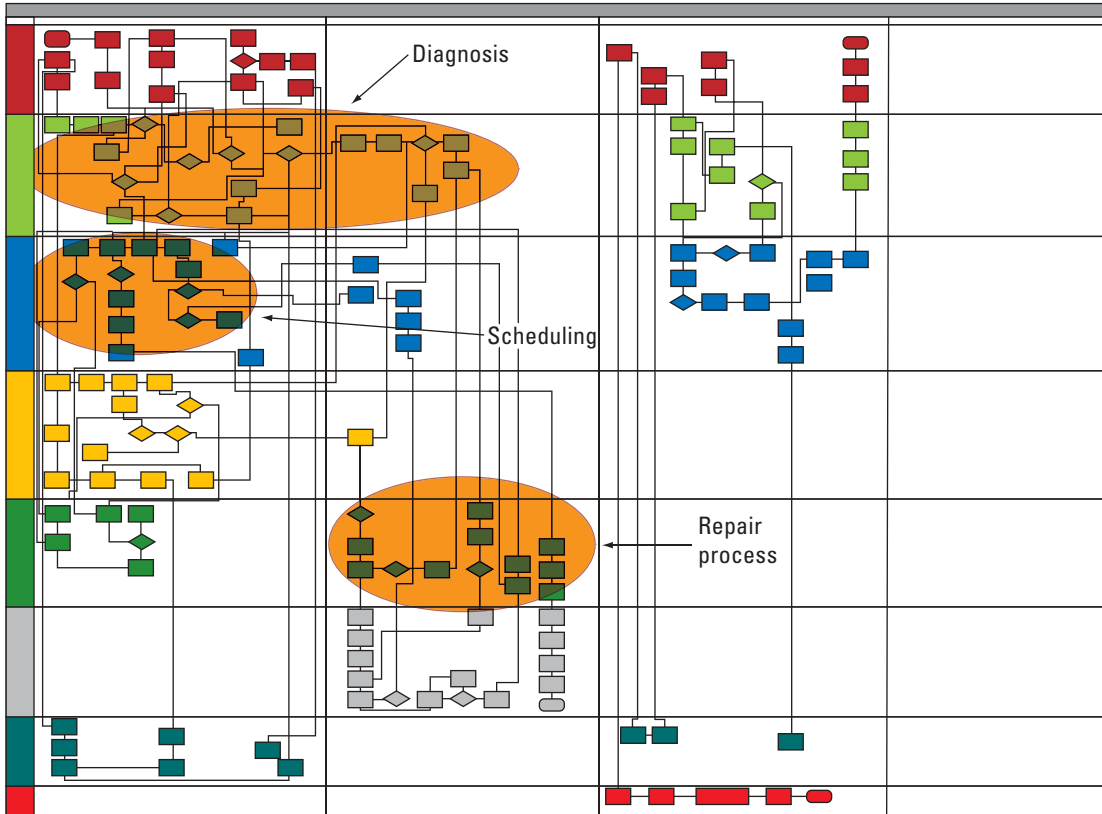
reduce without diminishing the organization's capability to deliver superior value.

REFERENCES

1. Bradley Gale, *Managing Customer Value*, Free Press, 1995.
2. Michael Marx, "Starting Up Six Sigma: The Elements of Success," *iSixSigma Magazine*, November/December 2005, pp. 33-41.

NOTE

For a deeper understanding of value measurement and management, see R. Eric Reidenbach, Reginald W. Goeke and Gordon McClung, *Dominating Markets with Value*, Rhumbline Publishing, 2001.

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