

# Management Accounting Systems and Performance Measurement at Lean Companies

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## EXECUTIVE SUMMARY

A survey of managers at manufacturing facilities interested in or actively engaged in Lean manufacturing and Lean production showed the biggest change in accounting and performance measurement was increased use of visual displays of nonfinancial operating performance measures in production areas. Facilities reporting the highest financial benefits from Lean improvements emphasize both financial and nonfinancial performance.

This article is based on research funded by the IMA® Research Foundation.

Lean production and Lean management practices are now commonplace in U.S. manufacturing, and these practices are making inroads in the health-care and service industries as well. The prevailing view is that conventional management accounting reporting, especially standard cost reporting, is an obstacle to Lean management. Many articles on the relationship between accounting and Lean management are case studies that report the experience of an individual company. For the most part, consultants write most of those articles and cite anecdotes from their personal experience.

We wanted a more comprehensive view of the state of accounting practices at companies adopting Lean management and production. We also wanted to examine the association between accounting practices, Lean management practices, and financial and operating performance.

Our online survey assessing the level of Lean management implementation and Lean accounting implementation found respondents realizing operational and financial performance related to implementing Lean practices at 697 plants or facilities. We asked about their Lean manufacturing strategies and practices, organizational culture,

performance measures, management control systems, internal accounting practices, and the performance improvement on eight dimensions, including cost and profitability, that their companies had realized from their Lean initiatives.

We obtained the participants from the Shingo Institute database of individuals who had expressed an interest in receiving information from the institute about Lean principles, operational excellence, Shingo seminars and workshops, and the Shingo Prize. We received usable responses from 368 facilities. With support from a research grant from the IMA® (Institute of Management Accountants) Research Foundation, we visited eight of these facilities to get greater insight into our survey results. While many of our findings confirmed our expectations, there were a few surprising results.

## KEY RESULTS

All respondents using Lean manufacturing practices in our survey had performance improvements realized from Lean initiatives, and the Lean practices used had positive associations with one another. We found no evidence to suggest that facilities were de-emphasizing some practices as they adopted or intensified their use of other practices. Aside from actual Lean manufacturing practices, changes in a company's culture to support Lean management were most significant in accounting for variation in realized improvements from Lean initiatives.

Conversely, a command-and-control culture characterized by a bureaucratic organization and centralized authority had a negative association with Lean manufacturing practices and, therefore, performance improvement from Lean initiatives. We were surprised that a bureaucratic organization and centralized authority were the only two items in our study that had a significant negative correlation with improvements realized through Lean initiatives.

Our research supports the common perception that Lean transformation of the accounting function lags behind other areas. Traditional accounting and reporting practices, including standard costing and variance analysis, remained dominant with facilities reporting lower usage levels of Lean accounting practices and

value stream costing (VSC). The biggest change in accounting and performance measurement was using visual displays of nonfinancial operating performance measures on the shop floor. Visual displays and an emphasis on nonfinancial performance measures were significant in accounting for variation in realized improvements from Lean initiatives.

VSC and Lean accounting practices were positively associated with Lean manufacturing practices and with improvements realized from initiatives, but they were not significant in explaining variations in improvements from Lean initiatives. Surprisingly, and contrary to prevailing views, standard costing and other traditional accounting practices were not obstacles to Lean manufacturing initiatives.

Increased emphasis on nonfinancial measures did not necessarily mean reduced emphasis on financial measures. Facilities reporting the highest levels of cost reduction and improved profitability from Lean improvements emphasize both financial and nonfinancial performance. Emphasis on financial measures was significant in explaining the variation in financial performance improvement due to Lean initiatives. We also found no evidence that emphasizing financial performance measures was an obstacle to Lean implementation and improvement.

As expected, facilities reporting high use of VSC also reported high levels of improvement due to Lean initiatives. We found that facilities with high use of both VSC and activity-based costing (ABC) reported the highest levels of improvement due to Lean initiatives. This was, to us, the most surprising—and intriguing—finding in our study. We expected value stream organization and the use of VSC to reduce the value of ABC, leading to lower use of ABC.<sup>1</sup>

## LEAN MANUFACTURING INITIATIVES, CULTURE, AND MANAGEMENT SUPPORT

We asked survey participants the extent to which their facilities had adopted 19 different manufacturing strategies, initiatives, and practices. As Table 1 shows, all 19 practices had mean scores of 3.0 or higher. The two practices with the highest mean implementation scores (using 5S and adopting a continuous improvement program) are practices usually started at the inception

**Table 1: Use of Lean Manufacturing Strategies, Initiatives, and Practices**

Please indicate below the extent to which your facility has implemented the following.				
Choices: not at all, little, some, considerable, great deal		N	Mean	SD
LMFG	Use of 5S	366	4.13	0.86
	Adoption of a kaizen (continuous improvement) program	365	4.10	0.91
LMFG	Use of standardization	368	3.89	0.82
	Regularly scheduled production maintenance	366	3.83	0.88
	Extended training of employees in various tasks	367	3.76	0.88
SUPP	Frequent contact with suppliers	366	3.75	0.93
SUPP	Established long-term relationships with suppliers	363	3.69	0.94
	A strategy to reduce the physical constraints in operations	365	3.67	0.89
LMFG	Use of production cells	366	3.67	1.07
LMFG	A kanban system	367	3.54	1.06
LMFG	Use of line balancing and level schedules	365	3.51	1.06
LMFG	Use of mistake proofing or poka-yoke	365	3.46	0.98
LMFG	An action plan to reduce setup times	367	3.42	1.02
	Reduction of buffer inventories	367	3.39	1.01
LMFG	Use of one-piece flow	367	3.30	1.11
LMFG	Reduction of lot sizes	365	3.29	1.09
SUPP	A strategy focused on reducing the number of suppliers	367	3.08	1.00
LMFG	Operators responsible for maintenance of own machines	363	3.07	1.03
	Suppliers deliver on just-in-time basis	364	3.00	1.06
Lean manufacturing practices composite (LMFG)		357	3.53	0.76
Supplier development composite (SUPP)		363	3.51	0.80

Note: Items designated LMFG or SUPP in the first column were the items included in those composite variables.

of a transformation to Lean management.<sup>2</sup> Two of the three practices with the lowest mean implementation scores pertained to relationships with suppliers. It was not surprising to see practices related to suppliers at lower levels of adoption, as many companies focus on internal practices before looking outward.

All 19 manufacturing strategies, initiatives, and practices were positively associated with one another and with performance improvements realized through Lean initiatives. We found no evidence of facilities

systematically dropping one or more practices as they adopted others.

Using factor analysis, we identified two composite variables related to Lean manufacturing practices, a 10-item Lean manufacturing practices variable (LMFG), and a three-item supplier strategy variable (SUPP).

We asked the survey respondents to report their level of agreement with 18 items related to their company culture. As Table 2 shows, the mean scores ranged from

**Table 2: Organizational Culture**

Please indicate what most closely represents your facility's organizational culture.				
Choices: (1) strongly disagree to (5) strongly agree		N	Mean	SD
EMP	Management is committed to quality-related training	365	3.87	0.83
	Line managers are empowered to make decisions	363	3.72	0.86
EMP	Production workers participate in quality-related decisions	365	3.61	0.84
EMP	The majority of our production workers are cross-trained	365	3.57	0.90
EMP	Employees are recognized for superior quality performance	365	3.55	0.88
WLC	Management is focused on eliminating waste everywhere	366	3.53	1.00
	Management style is more participative than autocratic	366	3.51	0.98
EMP	Training resources are readily available	365	3.46	0.84
WLC	Support areas (e.g., human resources, marketing, accounting, IT) participate in kaizen events	365	3.44	1.09
WLC	Every area of our facility works on continuous improvement	364	3.44	1.05
WLC	Our whole facility is trained in Lean principles	364	3.41	1.09
EMP	All employees are involved in problem solving	365	3.35	0.94
	Team members feel peer pressure to perform	363	3.35	0.79
	Responsibility for action items is posted on shop floor	364	3.34	1.05
B&CA	Authority is more centralized than decentralized	365	3.25	0.91
WLC	Lean thinking has permeated all of our operations	363	3.20	1.09
WLC	Team members encourage each other to gain additional training	363	3.14	0.76
B&CA	Management structure is highly bureaucratic	364	3.05	1.07
Employee training and empowerment composite (EMP)		363	3.57	0.66
Widespread Lean culture composite (WLC)		359	3.36	0.82
Bureaucracy and centralized authority (B&CA)		363	3.15	0.86

Note: Items designated EMP, WLC, or B&CA in the first column were the items included in those composite variables.

3.05 to 3.87. The cultural items most characteristic of the responding facilities were related to employee training and empowerment. Items related to Lean thinking and Lean culture being widespread had more moderate mean scores, which was not surprising, as it takes time for Lean concepts to permeate the entire company. Our responses were from facilities with a wide range of experience with Lean manufacturing.

Two of the four items with the lowest mean scores were related to bureaucratic structure and centralized

authority, a command-and-control culture. All the cultural items except these two had strong, significant positive associations with Lean manufacturing initiatives and the resulting performance improvements. In fact, out of all the items in our study, bureaucratic structure and centralized authority were the only two that had a negative association with Lean manufacturing practices and with performance improvement realized due to these initiatives.

In Lean production and Lean management,

**Table 3: Top Management Support**

Please indicate how supportive you feel top management is in:			
Choices: resistant, unaware, indifferent, encouraging, highly supportive	N	Mean	SD
Implementing Lean manufacturing practices	367	4.14	0.87
Initiating change programs	367	4.06	0.86
Providing training for new production strategies	367	3.84	0.90
Top management support (composite)	367	4.01	0.79

employees are trained in evidence-based problem-solving techniques and, whenever possible, decision making is pushed down to where the work is performed. It was not surprising to find bureaucratic structure and centralized authority as obstacles to Lean production and Lean management. Although low, the mean scores were still slightly higher than neutral, and our responses covered the entire possible range. Overall, bureaucracy and centralized authority were a significant challenge for the companies in our sample.

Only two composite variables related to culture emerged from our factor analysis of survey items, a six-item factor related to widespread Lean culture (WLC) and the two-item factor related to bureaucracy and centralization (B&CA). Our survey, however, included six items that emerged as factors related to employee training and empowerment in a prior study.<sup>3</sup> Those six items did not load on any factor in our analysis. We calculated an employee training and empowerment composite variable (EMP) with the six items from the prior study.<sup>4</sup>

Top management support was found to be critical for a successful Lean transformation. We asked the survey respondents three questions regarding their top management's support for Lean. As expected, these three items had significant positive associations with Lean manufacturing initiatives and the resulting performance improvements. The mean responses in Table 3 show that, on balance, our respondents felt top management supported their Lean initiatives. The three items emerged as a single factor in our factor analysis, so we computed a composite top management support variable.

### PERFORMANCE MEASUREMENT AND ACCOUNTING SYSTEMS

We asked our respondents to rate the importance of 13 types of performance measures (see Table 4). All 13 had significant positive associations with Lean manufacturing initiatives and the resulting performance improvement. The lowest mean value was for nonfinancial measures related to value stream performance, perhaps because only about half of the respondents reported being organized by value stream. We were surprised that the mean score for inventory turns was not higher. Freeing up inventory-related resources had the second-lowest performance improvement mean score. In Lean management and production, inventory is waste, so perhaps our responding facilities were not giving inventory reduction the attention it deserves.

We computed two performance measurement composite variables based on the factors that emerged from our analysis: a four-item factor with nonfinancial measures and cost of quality (NF), and a three-item measure with financial results and market share (FIN).

The survey respondents also indicated the extent to which their facilities used eight cost and performance measurement systems. The mean responses appear in Table 5. The top three mean scores are associated with conventional accounting systems, and the bottom two are related to Lean accounting. This is consistent with the commonly held view that the accounting function lags in transformation at most Lean organizations. It is also consistent with Manjunath H.S. Rao's survey of 13 mature Lean manufacturers that found only one had converted from standard costing.<sup>5</sup> Many facilities in our study could not use VSC (except

**Table 4: Importance of Performance Measures**

Please indicate how important these performance measures are to operations at your facility.				
Choices: not at all, somewhat, important, very important, critical		N	Mean	SD
	On-time deliveries	362	4.23	0.85
	Customer satisfaction	365	4.22	0.88
FIN	Overall financial results	364	4.21	0.86
	Productivity	364	3.95	0.90
FIN	Cash flow	363	3.74	1.13
	First-pass yields	363	3.54	1.08
NF	Cost of quality	363	3.48	1.08
FIN	Market share	363	3.45	1.18
	Cycle-time improvements	363	3.42	0.97
NF	Nonfinancial measures related to cell performance	362	3.21	1.07
NF	Nonfinancial measures related to facility performance	362	3.21	1.05
	Inventory turns	365	3.20	1.04
NF	Nonfinancial measures related to value stream performance	362	3.04	1.13
Nonfinancial performance measures composite (NF)		360	3.24	0.93
Financial performance measures composite (FIN)		361	3.80	0.89

Note: Items designated NF or FIN in the first column were the items included in those composite variables.

**Table 5: Use of Costing and Performance Measurement Systems**

Please indicate the extent to which your facility uses each of the following measurement systems.				
Choices: not at all, little, some, considerable, great deal		N	Mean	SD
Performance measures related to labor/material efficiency		362	3.86	1.00
Performance measures related to overhead volume/efficiency		360	3.69	1.02
Standard costing		360	3.64	1.04
Balanced scorecard		361	3.52	1.12
Target costing		358	3.02	1.13
Activity-based costing		355	2.94	1.12
Value stream costing		359	2.74	1.18
Throughput accounting		352	2.62	1.18

**Table 6: Reasons for Not Using VSC**

Why do you not use VSC? Choices: (1) strongly disagree to (5) strongly agree	N	Mean	SD	No. Agree or Strongly Agree
We do not understand VSC	287	3.48	1.07	143
Our auditors prefer standard costing	284	3.39	0.97	128
We do not see the benefits of VSC	283	3.13	1.18	78
It is too costly to implement new accounting systems	284	3.08	0.84	60
We are satisfied with our current costing system	283	2.90	0.97	70

perhaps on a pilot basis) because half of the respondents said their facilities were not organized by value stream.

We asked our respondents if their company (not just their facility) used value stream accounting to account for production. Of 358 facilities whose respondents answered the question, only 59 reported that their companies used VSC. We asked those who said their company was not using VSC to indicate why that was the case. The responses appear in Table 6.

A lack of understanding of VSC and its benefits, respectively, were the first and third most common responses, which suggests a failure of management accounting education and an opportunity for consultants and Lean accounting conferences. Auditors' preference for standard costing reflects their lack of understanding of VSC or a failure of some companies to reduce and control their inventories. Auditors familiar with VSC are quite willing to approve alternatives to standard costing if companies can demonstrate their inventory levels are relatively low and under control. Concern about implementation cost reflects a short-term focus on the cost of change and excessive discounting of the benefits of better information and the lower cost of operating and maintaining a VSC system.

We also asked about 26 characteristics of management accounting systems. The mean responses appear in Table 7. Seven of the nine characteristics with the highest mean scores were related to visual displays of mostly nonfinancial information where the work is done. In general, traditional accounting practices related to overhead allocation, variance analysis, and inventory tracking ranked moderately high, and characteristics related to Lean account-

ing ranked low. The facilities had transformed the reporting on the shop floor, incorporating nonfinancial information aligned with operational goals, but, overall, there was little change in internal financial reporting and the methods used to generate internal financial reports.

Three composite factors related to management accounting system characteristics emerged from our factor analysis: A 10-item factor related to visual displays of information on the shop floor (VIS), a six-item factor related to Lean accounting processes (LAP), and a six-item factor related to traditional accounting practices (TAP). We computed variables for each factor.

### PERFORMANCE IMPROVEMENT

Our respondents reported on the improvement their facility had achieved due to Lean initiatives on eight dimensions (see Table 8 for the mean scores). Cycle-time reduction and quality improvement had the highest mean responses, but there was little difference between the top six dimensions. The relatively low mean score for inventory improvements was a little surprising. Reduction in the need to monitor transactions had the lowest mean score, reflecting the low level of VSC and Lean accounting process implementation at the facilities in our survey.

All eight improvement dimensions loaded on a single factor, so we computed an overall improvement variable. We also computed a four-item operating improvement variable, and we used the cost reduction and profitability improvement dimensions to create a financial improvement variable.

We ran three stepwise regressions to explain the

**Table 7: Characteristics of the Management Accounting System**

For the following items, please mark the most appropriate response related to your facility's management accounting system.				
Choices: (1) strongly disagree to (5) strongly agree		N	Mean	SD
VIS	Information on quality performance is reviewed often	360	4.15	0.83
VIS	Visual boards are used to share information	362	4.10	0.86
TAC	Variances are used to compare actual results to budget	356	4.00	0.88
VIS	Performance metrics are aligned with operational goals	360	3.96	0.92
	Product costs are classified as direct or indirect	357	3.82	0.96
VIS	Many performance measures are collected on the shop floor	362	3.74	0.97
VIS	Charts showing defect rates are posted on the shop floor	361	3.72	1.06
VIS	Standard operating procedures are visible on shop floor	362	3.71	0.93
VIS	Information on productivity is updated frequently on the shop floor	362	3.69	1.07
TAC	Assigning accurate overhead costs to products is critical	360	3.58	0.93
TAC	Work-in-process inventory is updated continually	357	3.53	1.09
TAC	Tracking inventories is an important accounting function	362	3.51	1.00
LAP	We use standard operating procedures for accounting processes	357	3.48	0.89
VIS	We have created a visual mode of organization	361	3.43	1.03
VIS	Quality data is displayed at workstations	359	3.40	1.13
VIS	Training skills matrix is visible on the shop floor	360	3.33	1.17
TAC	Product costs are initially recorded on the balance sheet	354	3.30	0.90
	Floor markings are used to indicate flow of materials	359	3.25	1.03
LAP	Our management accounting system supports our strategic initiatives	357	3.17	0.96
	Product costs are traced directly to the cell or value stream	354	3.14	1.06
TAC	Assigning labor costs to inventory is critical	360	3.12	1.02
LAP	Our accounting closing process has been streamlined	358	3.09	0.99
LAP	Most routine bookkeeping activities are now automated	357	3.09	0.93
LAP	We have eliminated many reports that monitor routine transactions	356	3.00	0.96
LAP	Our accounting system was simplified in the past three years	357	2.74	1.00
	Most routine bookkeeping practices are now outsourced	353	2.39	0.96
Visual information composite (VIS)		351	3.72	0.76
Lean accounting processes composite (LAP)		345	3.09	0.72
Traditional accounting composite (TAC)		346	3.50	0.69

Note: Items designated VIS, LAP, or TAC in the first column were the items included in those composite variables.



**Table 8: Improved Performance as a Result of Lean Initiatives**

Please indicate to what extent Lean initiatives have affected the following:				
Choices: not at all, little, some, considerable, great deal		N	Mean	SD
OPIMP	Cycle/production time is improved	366	3.74	0.87
OPIMP	Quality is improved	367	3.66	0.85
	Overall communication is improved	365	3.65	0.84
FINIMP	Costs are reduced	366	3.63	0.99
OPIMP	Capacity is managed more effectively	366	3.61	0.87
FINIMP	Profitability is improved	366	3.55	0.90
OPIMP	Inventory-related resources have been freed up	366	3.26	0.94
	The need to monitor transactions is reduced	364	3.05	0.91
Operating improvements due to Lean initiatives (OPIMP)		364	3.57	0.75
Financial improvements due to Lean initiatives (FINIMP)		366	3.59	0.85
Total		359	3.52	0.72

Note: Items designated OPIMP or FINIMP in the first column were the items included in those composite variables.

variation in overall performance improvement, operating performance improvement, and financial performance improvement. We considered the same 19 dependent variables in all three regressions: The 11 composite variables appear in Tables 1 to 4 and Table 7, and the eight cost and performance measurement systems are in Table 5.<sup>6</sup> The regression results appear in Table 9. Seven variables were significant in explaining variations in overall improvement, six in explaining operating improvement, and five in explaining financial improvement.

As expected, Lean manufacturing practices were the most significant variable in explaining performance improvement because of Lean initiatives. Supplier development, another Lean practices variable, was significant in explaining overall improvement and operating improvement (OPIMP), but not financial improvement (FINIMP). After Lean practices, Lean culture was the most significant in explaining performance improvement.

Widespread Lean culture and employee training and empowerment were significant in explaining overall, operational, and financial improvement. A successful Lean transformation requires a change of culture as well as a change in practices. The difficulty of culture

change is the reason many companies are unable to sustain a Lean transformation. Bureaucracy and centralized authority, the only variable having a negative association with performance improvements, did not enter any of the models.

Culture change is almost impossible for a company without the support of top management. Although top management support was significant in the models for overall improvement and financial improvement, it did not enter the model for operational improvement. Aside from encouraging culture change, top management support was less important for operating improvements, perhaps because these improvements are the focus of lower management.

Visual management and nonfinancial performance measures were both significant in explaining overall improvement. Visual management was also significant in explaining operating improvement. Use of nonfinancial performance measures was not significant in explaining operating improvement, but the balanced scorecard (BSC), which includes nonfinancial measures, was significant. BSC was the only cost and performance measurement system variable to enter any of the models.

The importance of financial performance measures was a significant variable in explaining financial

**Table 9: Stepwise Regression Results—Explaining Performance Improvement**

Dependent Variable: Overall Improvement as a Result of Lean Initiatives					
Model	Sum of squares	df	Mean square	F	Sig.
Regression	114.66	7	16.38	124.47	< .001
Residual	38.30	291			
Total	152.96	298			
Independent variables			Standardized coefficients	t	Sig.
Lean manufacturing practices			.323	7.03	<.001
Widespread Lean culture			.164	3.11	.002
Employee training and empowerment			.149	2.88	.004
Visual information			.122	2.48	.014
Supplier development			.105	2.99	.003
Nonfinancial performance measures			.099	2.28	.024
Top management support			.091	2.18	.030
Adjusted R-squared .744					
Dependent Variable: Operating Improvement as a Result of Lean Initiatives					
Model	Sum of squares	df	Mean square	F	Sig.
Regression	124.42	6	20.74	128.34	<.001
Residual	47.51	294	.162		
Total	171.93	300			
Independent variables			Standardized coefficients	t	Sig.
Lean manufacturing practices			.332	7.05	<.001
Widespread Lean culture			.171	3.27	.001
Visual information			.178	3.54	<.001
Employee training and empowerment			.172	3.24	.001
Supplier development			.110	3.02	.003
Use of the balanced scorecard			.084	2.45	.015
Adjusted R-squared .718					
Dependent Variable: Financial Improvement as a Result of Lean Initiatives					
Model	Sum of squares	df	Mean square	F	Sig.
Regression	113.32	5	22.66	62.93	<.001
Residual	106.96	297	.360		
Total	220.28	302			

**Table 9: Stepwise Regression Results—Explaining Performance Improvement (continued)**

Independent variables	Standardized coefficients	t	Sig.
Lean manufacturing practices	.287	4.97	<.001
Widespread Lean culture	.142	2.08	.039
Financial performance measures	.194	4.49	<.001
Top management support	.157	2.76	.006
Employee training and empowerment	.143	2.08	.039
Adjusted R-squared .506			

**Table 10: Performance Improvement from Lean Initiatives by Level of Use of VSC and ABC**

	Low ABC use	Medium ABC use	High ABC use
High VSC use	Overall – 3.56 Operating – 3.55 Financial – 3.63 N = 12	Overall – 3.82 Operating – 3.84 Financial – 3.91 N = 30	Overall – 4.03 Operating – 4.10 Financial – 4.12 N = 62
Medium VSC use	Overall – 3.53 Operating – 3.62 Financial – 3.55 N = 19	Overall – 3.63 Operating – 3.70 Financial – 3.65 N = 59	Overall – 3.71 Operating – 3.74 Financial – 3.77 N = 28
Low VSC use	Overall – 3.03 Operating – 3.09 Financial – 3.12 N = 85	Overall – 3.33 Operating – 3.39 Financial – 3.49 N = 38	Overall – 3.22 Operating – 3.27 Financial – 3.32 N = 21

Post hoc tests of equivalence of means were run at a  $p < .05$  confidence level. Dark shading indicates significantly lower mean levels of improvement than in the high ABC and VSC cell. Light shading indicates significantly lower mean levels of overall and operating improvement (but not financial improvement) than in the high ABC and VSC cell.

improvement. This is consistent with Robert Kaplan and David Norton’s BSC work in which they stressed tracking financial results as well as nonfinancial measures of the financial performance drivers. Visual information and use of nonfinancial measures did not enter the financial improvement model.

**VSC AND ABC**

VSC and ABC had relatively low mean scores for usage, but both had positive associations with

Lean manufacturing practices and performance improvements from Lean initiatives. We wanted to explore these relationships further. We expected that increased use of VSC would reduce the need for and value of ABC.<sup>7</sup> We split our sample into low, medium, and high users of both VSC and ABC. We compared the mean improvement as a result of Lean initiatives for the nine combinations of varying usage levels of VSC and ABC. The results appear in Table 10.

The facilities in our study were not replacing ABC

with VSC. In fact, most facilities with high use of VSC also had high use of ABC. Facilities reporting high use of both had higher mean scores for performance improvement due to Lean initiatives than any other combination of VSC and ABC.

## FINAL THOUGHTS

Gary Cokins maintained that companies could use ABC and VSC in tandem: VSC reporting would inform shop floor workers, motivating and supporting continuous operational improvement, while ABC would support strategic decision making.<sup>8</sup> Our survey results support the tandem use of ABC and VSC. Our respondents reported on the extent of using VSC and ABC, but they do not describe how they construct or use both systems. None of the facilities we visited as a follow-up to our survey were high users of both, so we do not have a case to illustrate how the facilities use ABC and VSC in tandem. We would love to hear from any facility or company that is using both in tandem.

Our survey results underscore the importance of developing a company culture that supports Lean management and provides training and empowers employees. It also suggests we have a long way to go in engaging accountants in the Lean transformations. Use of VSC and Lean accounting processes were not significant variables in our study, perhaps because their use is still relatively low.

Our field visits did provide insight into why companies have been slow to adopt VSC. A small company where the president was involved in daily production felt his simple traditional financial reporting system was sufficient for his needs. He focused on overall company financial performance more than the financial performance of each value stream. While he was not very familiar with VSC, his priority was improving production and sales.

On the other end of a scale, the manager of a facility belonging to a large multinational corporation said its management had some interest in VSC but wanted its accounting system to be uniform across all facilities. Management did not want to make a system change until all its facilities reached a certain level of maturity in Lean production. The transformation of accounting systems in large corporations may be limited by their

weakest link. We believe chief financial officers and top management would make the Lean transformation in accounting a higher priority if they had a better understanding of the potential benefits.

Although we did not find standard costing and traditional accounting practices to be an obstacle to Lean manufacturing initiatives, we believe managers should still be wary of traditional systems and reports motivating anti-Lean behavior. Traditional accounting can encourage overproduction, local optimization, and production of excess inventory, all anti-Lean behaviors. We conducted our study during the recovery following the financial crisis and before the economic disruption caused by the COVID-19 pandemic. Since the facilities we visited were expanding production to meet the challenge of the current demand, the risk of overproduction was much smaller.

During one of our visits, we observed that the facility's traditional accounting measures and its nonfinancial shop floor measures were both signaling improved performance. We asked, "What happens if in the future, your shop floor measures and your traditional accounting reports send conflicting signals, which measures would take priority?" The manager responded, "Right now, I believe we would prioritize the shop floor measures." We would love to know whether Lean facilities where traditional financial reporting still predominates were able to resist the pressure to overproduce while the economy contracted. ■

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## ENDNOTES

- 1 By creating value streams with products having relatively homogeneous use of activity cost drivers, VSC can greatly reduce the product cost distortions ABC systems reveal, while avoiding the cost and complexity of ABC systems (see Lawrence P. Grasso, "Are ABC and RCA Accounting Systems Compatible with Lean Management," *Management Accounting Quarterly*, Fall 2005, pp. 12-27).

- 2 5S is shorthand for the five steps of a process to achieve workplace organization. 5S is a key component of Lean management.
- 3 Rosemary R. Fullerton, Frances A. Kennedy, and Sally K. Widener, "Management Accounting and Control Practices in a Lean Manufacturing Environment," *Accounting Organizations and Society*, January 2013, pp. 50-71.
- 4 The "line managers are empowered to make decisions" item relates to the employee training and empowerment composite variable, but that item was not included in the Fullerton et al. 2013 study, so we did not include it in our composite variable.
- 5 Manjunath H.S. Rao and Andrew S. Bargerstock, "Do Lean Implementation Initiatives Have Adequate Accounting Support?" *Management Accounting Quarterly*, Summer 2013, pp. 12-21; Andrew Bargerstock and Ye Shi, "Leaning Away from Standard Costing," *Strategic Finance*, June 2016, pp. 38-45.
- 6 The independent variables used in the stepwise regressions were: Lean manufacturing practices, supplier development, employee training and empowerment, widespread Lean culture, bureaucracy and centralized authority, top management support, nonfinancial performance measures, financial performance measures, labor and material efficiency measures, overhead volume efficiency measures, standard costing, balanced scorecard, target costing, activity-based costing, value stream costing, throughput accounting, visual information, traditional accounting practices, and Lean accounting practices.
- 7 Grasso, 2005.
- 8 Gary Cokins, "Lean Accounting and Activity-based Costing—A Choice or a Blend?" *Cost Management*, January/February 2019, pp. 5-15.