Survival Strategies of Lean Organizations

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This paper investigates strategies adopted by lean organizations to survive the deteriorating economy. It identifies practices of top-notch suppliers to the NUMMI automotive plant in Fremont, California to manage the supply chain and cut production, while retaining talent and critical resources to continue operations. The paper addresses how to handle challenges of survival, culture forced to change, and factors considered in downsizing and minimizing the negative effect on the workforce, and other actions for damage control. These strategic approaches taken by leading lean organizations may provide viable solutions for other companies facing the survival strategy question.

I. INTRODUCTION

This paper is not about the ongoing need for continuous improvement. It is also not about the process re-engineering commonly seen in turnaround efforts. This paper is about highly disruptive events or upheavals often brought on by external forces out of our control, which threaten even well run companies (Collins and Jack, 2009-1). Current national employment losses are following trends similar to the 1981 recession and orders for high-end products continue to decline, further exacerbating the problem and causing further declines in employment. Due to the uncertainty of economic conditions, businesses have to find a strategy that will help them survive; as strategies that have worked in the past, for many companies, do not appear to be working today. For many companies, formulating a "best strategy for survival" until economic conditions become more favorable is essential.

Toyota Production System (TPS) has been widely recognized as one of the most efficient production systems, based on generating profit through cost reduction and elimination of waste (Monden, 1993). Everything that does not add value is "waste" and the elimination of waste increases profit. Companies that use the techniques and philosophies of the TPS tend to be more efficient and often have lean operations.

This paper studies the survival strategies during the downturn economy utilized by four companies, which are using the TPS. These companies are Tier 1 and Tier 2 suppliers to the New United Motors Manufacturing, Inc. (NUMMI) automobile plant. NUMMI is the pioneering joint venture of GM and Toyota, established in 1984 in Fremont, California. The analysis of these four suppliers focuses on current and anticipated strategies for primary management practices (strategy, execution, culture and structure), secondary management practices (talent, innovation, leadership, mergers and acquisitions), market share (retaining, growing and entering new markets), and company downsizing (facilities and human resources). For the purpose of this paper, primary and secondary management practices have been combined.

II. METHODOLOGY

The participant companies provide an overview of their implementation of the various operational TPS practices that each has used in the past as well as present, and those they plan to implement in the future. The participating organizations also provide information relative to

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the business strategies that they are using, or plan to use, in countering the current economic downturn. Comparison of this information identifies common themes within and contrasts between the various strategies, as well as the relative importance of the strategy to each participant company. All participants' data reflects overall strategies and policies. However, more specific emphasis is placed on the participants' policy implementations and reactions to the roughly 40% reduction in production orders from NUMMI, the extended NUMMI plant shutdowns in December 2008 and January 2009, and the uncertainty of the future of NUMMI orders. Some of the participating companies agreed to participate in this study under the condition of anonymity, therefore the list of NUMMI suppliers in Table 1 includes both participant and non-participant companies. They are from the local geographical area and listed in alphabetical order. Inclusion in the list does not correlate to actual participation, and exclusion from the list does not correlate to non-participation.

The study includes companies from a single market segment (automotive) in order to minimize the influence of non-strategic effects and more closely align the study data with the actual impact of the companies' strategies. In order to avoid or minimize the potential for sharing competitive advantages with direct competitors, the selection of the participant organizations includes companies that are not direct competitors. Each is at a different stage in their development and each has different product offerings, while at the same time, all are in a similar market sector of the economy.

The data are collected using a variety of methods. For each participant, some combination of the following methods is used: personal interviews with executive staff and senior management, production control, quality control and/ or production personnel, site tours, inspections of process control charts and participant management tools, and personal audits of other data made available by the participating organizations. Due to the variety of management practices employed by the various

TABLE 1: SELECT LOCAL NUMMI SUPPLIERS

Supplier	Location	Commodity
Aisin Electronics	Stockton	Relays & Controls
Aisin Manufacturing California	Stockton	Door frames
Amtex, Inc.	Manteca	Carpet & Trim
Arvin Sango, Inc.	Merced	Exhaust Systems & Parts
Dana Corporation - Parish	Stockton	Frame Assemblies
Fuel Total Systems California Corporation	Lathrop	Plastic Fuel Tanks
Injex Industries, Inc.	Hayward	Door panels, Seating trim, Plastic molding, Fuel tank components, Cooling systems
Johnson Controls, Inc.	Livermore	Seating, Interiors, Electronics
Kaneka	San Leandro	Plastic body & trim parts
Kyoho Manufacturing	Stockton	Metal stamping, body shell
Mission Tool and Manufacturing Co.	Hayward	CNC machined tool & die services
Pacific Coast Industries	Tracy	Brake system components
Pilkington LOF	Lathrop	Glass subassemblies & interior
Plastikon Industries, Inc	Hayward	Injection molded components
TG California Automotive Sealing, Inc.	Hayward	Injection molded interior trim
Trim Masters, Inc.	Modesto	Seating, Interiors, Trim
Tuscarora, Inc.	Hayward	Expanded foam / packaging
Vuteq California Corporation	Hayward	Glass subassemblies & interior
Wingard Quality Supply	Fremont	Wheel & tire assemblies

participants, not all methods are used with all participants. Only those methods that are necessary, given the organizational structure, are employed to collect data.

III. ECONOMIC ENVIRONMENT CONDITIONS

As stated in the introduction, all economic measures show that the U.S. economy is deteriorating and businesses are now operating under economic conditions that many have never faced before. Total non-farm employment continues to decline (Figure 1) and manufacturing employment, representing our participant organizations, tracks (lagging) the overall employment decline (Figure 2).

According to the October 2009 Bureau of Labor Statistics (BLS) report released on November 6, 2009, payroll has fallen for 22

FIGURE 1: EMPLOYMENT CHANGE TOTAL NON-FARM

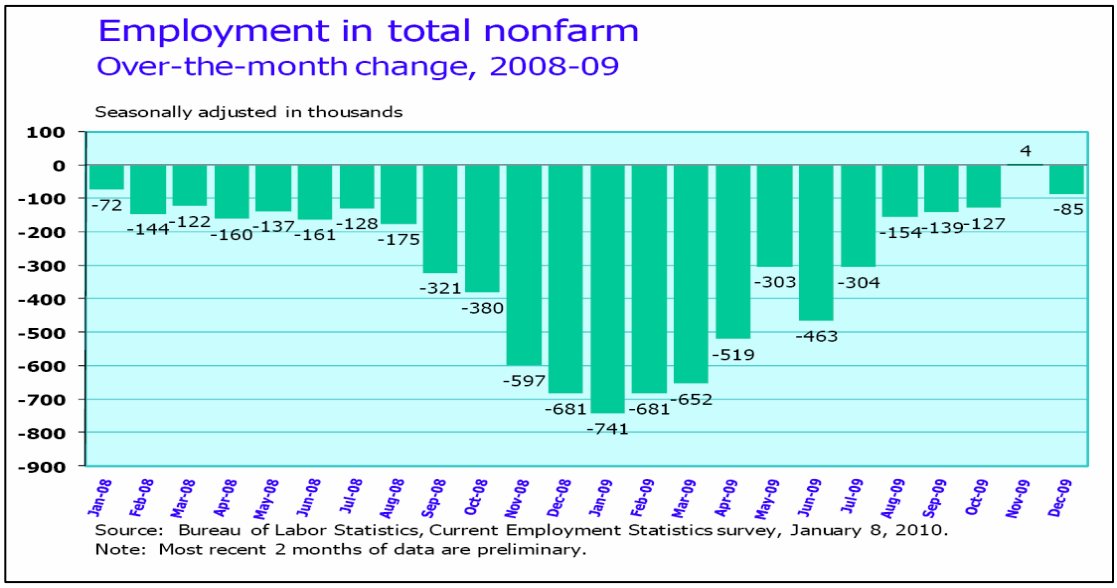
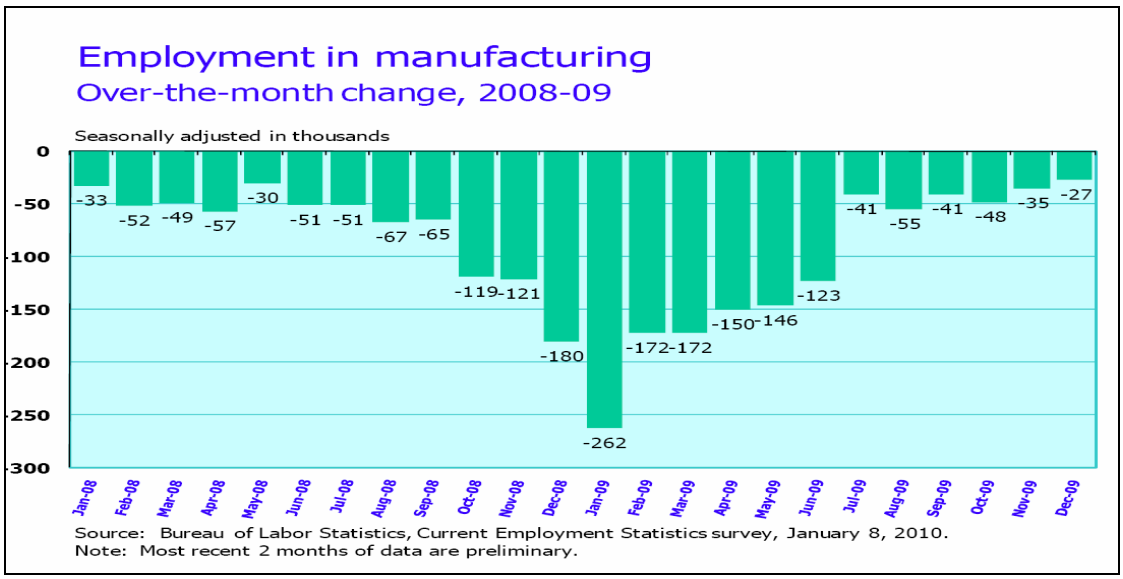


FIGURE 2: EMPLOYMENT IN MANUFACTURING



months, with losses totaling 7.3 million. The overall employment picture continues to be bleak. The report states that payroll employment has declined by 3.9 million in the past 6 months, or an average of 656,000 per month. This is the largest 6-month decline since the series began in 1939. While the rate of job loss appears to be slowing, in Q4 2009 there still were 558,000 new unemployment claims (non-farm of 190,000), bringing the total unemployment to 15.7 million (BLS, October 2009).

The government does not acknowledge the current financial crisis as a depression, and comparison to recessions in the past do not paint a clear picture as to whether this is a recession like that in 1981, deep and short, or like 2001, shallow, but long. The current recession is already deeper than the 2001 recession, but not as deep as the 1981 recession, and not near the proportions of the great depression (Cornwall, 2009).

Without some indication of the ultimate depth and duration of this downturn, how are companies going to plan strategies to survive? For many companies, the typical downsize of staff, cutback in spending, and improvements in efficiency have been inadequate to cope with the current financial downturn. Even those that are already operating at the peak of efficiency, lean to the bone, and right-sized by design are working feverishly to create strategies for survival.

IV. IMPACT ON SUPPLIERS

Toyota and NUMMI are significant contributors to the economy and their importance should not be underestimated. According to Rick Hesterberg (2009), in the U.S., there are approximately 63,000 supplier jobs in 38 states dedicated to Toyota. Toyota collectively spent nearly $30 billion on parts, goods, and services last year in North America. The amount that Toyota spends in North America is more than the $16 billion California budget deficit in 2008 and is ¾ of the expected California budget deficit of $41 billion over the next 18 months (Halper, 2008 and Kloberdanz, 2009). NUMMI and its suppliers represent a significant part of Toyota's U.S. investment. NUMMI produces about 400,000 Toyota Corollas, Tacoma Trucks, and Pontiac Vibes in the Fremont facility and employs nearly 5,000 workers (KGO-TV/DT). Local NUMMI suppliers account for roughly another 2,000 workers.

For each car or truck cut from the production schedule at NUMMI, an equivalent volume reduction occurs at NUMMI suppliers, which result in reduced utilization of production capacity and dramatically impacts inventory levels at suppliers. Some participant suppliers experience order cuts to 60% of normal volume. Others describe orders as "coming in waves" that oscillate as NUMMI tries to adjust from a level production model to a sales response model. The cutbacks result in excess inventory and inventory overflow for many suppliers. Excess inventory results in inefficient use of capital, requirement for extra warehouse space, and increases in inventory management costs. Unlike many suppliers, NUMMI prohibits some Tier 1 suppliers from reducing orders to the Tier 2 suppliers (subcontract suppliers) by more than 20% in any given month (regardless of the NUMMI cuts). This restriction causes an incoming "wave" of inventory that cannot immediately be stopped. Subsequently a much longer time is required to consume the inventory than would normally be required.

V. REVIEW AND COMPARISON OF STRATEGIES

5.1. Primary & Secondary Management Practices

With regard to implementation of the TPS, each NUMMI supplier has their own concept of what part of which systems are important. Not surprisingly, each emphasizes or excels in the areas they determine to be most important to their operation. Most of the suppliers that participate in this study have

mission and or vision statements. Some executive and senior managers can quote them, but most of them cannot. Of the production workers interviewed, none could cite a mission or vision statement, but some line workers describe the concept behind their company's vision or quality statement. It seems universal in these companies that their practical application of TPS and Lean processes does not require emphasis on "company statements". For most, the theme is "highest quality at the lowest possible cost to the customer", with "ethical" implied in there somewhere.

The philosophical views on lean at the participant suppliers are almost as varied as the interpretations and implementations of TPS and Lean principles. While one supplier makes every effort to conform to the TPS model in every possible way, at the other end of the spectrum is a supplier that "does lean for everything below the bottom line", that is, they implement lean only where it provides a positive return on the resources invested. One supplier with strong Japanese ties implements TPS throughout the operation, at times in conflict with "American" logic, which ultimately forces a compromise. The conflict can be something as minor as moving material. While Just-in Time says to deliver only one container of parts to a work cell when those parts are needed, for the sake of travel efficiency, two stacked containers are delivered at the same time, to save motion. Within this supplier then, adherence to TPS is essential, but "Americanized" modifications are acceptable at some level.

The supplier with the below the "bottom line only" TPS implementation may in fact have a more pure understanding of TPS. An understanding adhering, in the strictest sense, to the premise that TPS is a viable method for making products because it is an effective tool for producing the ultimate goal – profit (Monden, 1993). Further evidence of this supplier's understanding of their implementation of TPS is how they address material scrap. Scrap is waste, but to reuse this waste the cost would exceed the benefit; therefore, an outside vendor recycles it. In TPS, Monden states that the main purpose of the system is to eliminate, through improvement activities, various kinds of waste lying concealed within a company. This supplier determines that anything that does not add value to the product and does not flow to the bottom line (profit) is waste. This supplier thinks, "not waste as waste, but waste as money". Although their production line is not optimized, it is OK to sub-optimize operations in order to achieve shop floor balance (Collins and Jack 2009-2). They focus on the waste, not on the people.

Two suppliers reuse or recycled scrap material in house and their efforts benefit both the bottom line and the environment. The other two suppliers recycle scrap material using third party vendors. Two of the suppliers were very effective at maximizing freight efficiency when shipping to NUMMI. This is important to such an extent that they photograph every outbound truck to record their effectiveness. Analysis of the photos helps them to continue to improve in this area. One problem faced by other NUMMI suppliers is that NUMMI will specify the quantities and sequence of loading within a truck, so if NUMMI does not maximize the cube, the supplier is stuck with inefficient transportation and its associated costs.

The Poke Yoke (mistake proof) processes and device implementations are most interesting. In the words of one supplier, "We can make it mistake proof, but we can't make it idiot-proof". All suppliers seemed to have various levels of mistake proofing measures in use. One supplier uses a very formal approach to Poke Yoke issues. The first step, "genchi-genbutsu" – you must see the problem to understand the problem" is essential in their process. Supervisors cannot respond to problems or propose solutions unless they first go to the production floor to observe the problem. Their last step is based on the attitude that it is not fixed until you prove it is fixed. There is no assumption that a corrective action fixes a problem, the fix must prove effective. Between these two points, the

beginning and ending of the Poke Yoke development process, many forms of analysis might take place, but the start and end of the problem resolution process are clearly defined. Another supplier made effective use of Poke Yoke (mistake proofing) devices on the production floor; the lack of data reporting made it difficult to quantify some of their failure mechanisms. As a result, this supplier invests more heavily in rework and repair operations than the other suppliers do. When faced with chronic failures on the production floor this supplier makes good use of fishbone charts to isolate the causes and correct the problems. Their shortcoming is that the problem must become chronic before it gets attention.

One supplier utilizes a three-person kaizen (improvement) team to identify potential areas for improvements. This organization holds frequent meetings to solicit input. Another supplier used to believe that kaizen starts at the bottom, but now kaizen activity is driven from the top down. The logic behind this change in philosophy is that the people on the production line are at the lowest level on Maslow's hierarchy of needs. They live paycheck to paycheck and cannot see to embrace Lean. They are paid whether they make improvements or not. According to Hitt et al. (2009), this supplier might do better by adopting a more transformational leadership style. Transformational leadership is the most effective strategic leadership style. To properly influence employees' judgment and behavior, the firm's decision-making process must be an integral part of the organizational culture. The ROWE, or Results Only Work Environment, at this supplier does not promote the suggestion or implementation of kaizen, and only offers a token reward if any; therefore, the of lack incentive for Kaizen improvements rests with the employer, not the employees in this organization (Hitt et al., 2009). Is it possible that this supplier, better perhaps than some others, understands the difference between the Japanese and American cultures? This supplier may be trying to force kaizen from the top because the system does not adequately encourage line workers to develop Kaizen input.

All of the suppliers have their own versions of Andon (visual display) systems in use. Management by sight (visual control) (Suzaki, 1997) is evident in all facilities. The implementations range from very elaborate lighted signs that include different audible tones to signal supervisors that their area needs attention to simple paperboard signs where they post the current work cell status.

The material flow and management systems vary from one supplier to the next. The kanban (visual card) material replenishment processes and controls across these suppliers follow an almost linear scale. One supplier uses a very precisely timed delivery system where raw material delivery is at regular intervals based on the current tact time. For this supplier, finished goods collection for shipment is done in the same manner, by the same delivery system. The simplest system involves having the forklift driver make visual inspections of each station as he routinely delivers parts or picks up finished goods. Some suppliers use kanban cards; others do not. All suppliers have some form of notification or escalation process available in the event that a line stoppage occurs for lack of raw materials.

Regardless of whether the supplier has a formal quality department or not, the quality focus of these suppliers is to build quality at the source, not try to inspect it into a part after building it. Some of the suppliers of welded parts routinely perform destructive testing in order to confirm reliability of the parts. Testing at all suppliers, when part of the process, is performed at specific times in order to document ongoing quality and facilitate damage control in the event that defects are found. One supplier, up until recently had separate departments for quality and maintenance. In recent moves, they eliminated both departments. The premise being that the machines produce the parts, and the operators on the floor function as quality

inspectors in the process. At this supplier, floor supervisors perform maintenance and repair functions

Each supplier handles tooling changeover differently because of the diverse nature of the parts produced for NUMMI. At highly mechanized plants where extremely expensive machines are in use, tooling changeover is critical to efficient throughput. Suppliers with less expensive equipment allow more time for changeover from one part to the next. In order to minimize wait time, one supplier has supervisors start thirty minutes before the production shifts start in order to have supervisors set up for production and perform changeover operations.

The data collection and reporting systems at each of the suppliers is radically different. The critical data reporting function can be more uniform, as it is not dependent upon any unique technology. Some suppliers have technology-enabled machines that provide for automatic data collection; others do not. This difference is not surprising. The surprise comes from the diversity of the data that is collected and reported (or not) at these suppliers. One supplier monitors every defect or other deficiency detected and keeps the information in a database to enable them to perform analysis of the type, frequency, location, machine, operator, and numerous other factors. This supplier also collects data on throughput, downtime, and downtime causes (unscheduled machine maintenance, material shortages). Another supplier records and reports almost nothing, other than raw material in, and finished goods out. All of these suppliers receive supplier awards from NUMMI or Toyota, and in some cases, from both. One would expect more consistency in this area, as supplier quality awards across the board would indicate a similar level of quality performance. One supplier has a unique perspective of the awards given by NUMMI, what they mean and how they are earned. First, all suppliers have safety stock because NUMMI forces them to carry it so NUMMI does not have to. Carrying safety stock for NUMMI, although wasteful, creates a situation where missed shipments are less likely. In most cases, the suppliers use safety stock to make shipments when they have a problem, without affecting NUMMI. Accordingly, awards for on-time delivery performance are relatively easy to get. Lowering inventory does not create Lean Manufacturing. Without safety stock, suppliers struggle to meet production when demand changes (Shaer and Goedhart, 2009). Another supplier reports, "Everything they do is based on money and we get recognition awards only because they make money."

5.2. Current & Anticipated Strategies for Market Share

One lesson learned from the four NUMMI lean suppliers is that understanding the organization's business is the key to making the right strategic decisions in an economic downturn. The inability to respond or identify the need for change in the competitive environment is one of the reasons that some organizations fail (Hitt et al., 2009). Traditionally, cost cutting is always a primary consideration; however, we can't cost cut our way to profitability (Turbade, 2009). Managers need to look beyond the obvious and keep their attention on both the top and bottom line, shifting their focus away from traditional safety, quality, cost, and delivery (SQCD) to new products and market penetration strategies. In addition, they should focus on quicker time to market and on identifying weak competitors from which to take business as a way to expand their own business. New technologies for market penetration should also be considered. When it comes to value stream, most companies focus on delivery and forget demand creation and developmental (new products etc.). It is more important to analyze the extended value, not just the value stream within the four walls of the production facility. They should be seeking new ways to create greater demand and creating new products or services, or creating new applications for existing products, as well as, involving suppliers and customers in the value stream analysis.

Consolidation makes suppliers overly dependent on a single customer (Shaer and Goedhart, 2009). This is now the case in many industries, especially the auto industry. It is important that suppliers perform risk assessments and establish risk mitigation-plans to ensure their survival, especially in uncertain times.

All suppliers in this study use centralized control strategies within individual plant operations. One of the participant's strategies is to split itself into smaller parts. An advantage to this strategy is that the remaining entities can become more agile and improve performance in the future. Poor performance is often a reason for diversification or divestiture (Hitt et al., 2009). This restructuring will help in the push for innovation and price competition. It also allows them to divest themselves from poor performing business segments.

Another supplier is expanding operations and is opening another plant in anticipation of increased, rather than decreased revenue from the automotive sector. This supplier is positioning to be able to pick up additional business from other automotive suppliers that will not survive the current downturn. Only one supplier is working on developing products outside of the automotive market.

Some NUMMI suppliers are wholly owned subsidiaries of parent companies that dictate the business strategy of the subsidiary. For these organizations, the parent company may prohibit the subsidiary from seeking revenue from other markets. For these companies, their entire future may depend on the success or failure of the NUMMI operation. These suppliers fit the "Greenfield Venture" model of the parent companies' strategies (Hitt et al., 2009). When questioned about the impact of a possible closure of the NUMMI plant, one of these suppliers indicates, "they hope" that the parent company will generate new business for them, while the other suggested that a dismantling of the local operation would be the result.

5.3. Downsizing

Each company also has different policies with regard to the human factor, although they have several common practices in this area. The relatively inflexible production cells in use at one supplier reduce the ability of this supplier to respond to cuts in production. As a result, production labor cuts are one of the few areas identified for overall cost cutting. According to this supplier, "The no-layoff policy in the Toyota family does not extend to its suppliers." It would be unfortunate if this suppler cannot identify other areas in which to cut costs if more cuts are needed in the future, because research evidence shows that moderate-sized layoffs may improve firm performance, but large layoffs produce stronger performance downturns in firms because of the loss of human capital (Hitt et al., 2009).

The executives at three of the four suppliers that participated in this study express their company culture with some reference to "family". It is surprising that the line workers at the company that exhibits the most dictatorial control over the operation said that they also feel that there is a "family" feel to the company culture, and that they feel comfortable in trusting their future employment to the management team. Generally, all suppliers express an environment of respect for people and encourage open relationships and communication. This philosophy is more plainly visible at some suppliers than at others.

One supplier believes in promoting the "family" culture to such an extent that, even in these difficult times, every plant still has an entertainment budget. The cost of keeping the "perks" for the plant is insignificant compared to other costs. This supplier states, "We stay focused on dollars, not on pennies". They also go a step further in trying to retain their employees, by having their regular employees perform janitorial and landscaping jobs that were previously outsourced.

Each supplier has their own method or process for dealing with downsizing, but all seem to agree that minimizing the negative impact on

the employees is important. Whether the process involves purely seniority based selection, HR factors such as attendance, attitude, performance, critical job skills, flexibility or other factors, all emphasize the importance of communication to the employees. All suppliers agree on most, if not all, of the following points. First, they look for alternative ways to save money and avoid layoffs as long as possible. If possible, they offer early retirement, shut off second shift and create work-share programs, and cut work hours and workdays. Most employees prefer that everyone work reduced hours rather than losing some co-workers, especially if their own job is in doubt. If they must do a layoff, the general manager communicates directly to middle management so that everyone understands the situation at this level. All issues must be resolved at the middle management level before communicating to lower levels (administration & hourly). When communicating to the lower levels, management makes sure that the employees understand that everything is tied to revenue (sales) numbers at the current level. They communicate updates of the sales numbers on a regular basis and hold meetings with teams to solicit alternative means of reducing costs. One supplier adds this idea; people aligned with lean already understand their value. Those not aligned are less valuable. Make sure that this is clear to the employees and they will generate further cost reductions for you. This supplier subscribes to the use of activity-based compensation, considering different metrics to reward employees – including productivity, quality, tardiness, absenteeism, health and safety (Bishop, 2009).

VI. CONCLUSIONS

Understanding the entire business and knowing what to change is the key to surviving in a down market. Having a strong "family" of suppliers, strong commitment to continuous improvement, and very flexible production systems provide lean managers with effective weapons to deal with the current downturn economy. They involve customers and vendors in analyzing the entire value stream and are always looking for new opportunities to leverage current products, identify opportunities for new products within the existing customer base, as well as developing products or services for new markets. They also might adopt a position that can capitalize on the weaknesses of competitors and leverage complimentary product suppliers.

Traditional strategies for cost containment and cost reductions usually focus on activities such as a hiring freeze, tighter inventory management, release of temporary employees, partial layoffs, cuts to salaried employees pay, complete layoff of secondary shifts, and company-wide layoffs. Managers of lean organizations do not subscribe to most of the traditional strategies of cost reduction. They will not layoff regular employees unless it is absolutely the last resort. Instead, they would use work-share programs to provide maximum employment to the maximum number of employees. They would also consider activity-based compensation to improve efficiency of the workforce and trim expenses.

Lean managers do not let fear drive their decisions, rather, they make them by a firm commitment to find or develop ways to improve revenue and profits. Some managers look toward outsourcing as a way to cut costs. Outsourcing rarely saves money in the long term. Instead, lean managers use the regular workforce to bring in those jobs, which are typically outsourced such as housekeeping. It is generally easier to retain talent at the top levels, but more difficult at hourly levels. Lean managers are usually diligent in identifying and providing, where possible, the individual incentives that will help them to retain their top performers. Workers usually respond positively if offered job improvements, shown respect, given valuable jobs and given open lines of communication within the organization. Open communication can go a long way toward reducing the fear of uncertainty in employees.

In these tough economic times, the Supply Chain of the 21st century faces some of the same challenges and opportunities as these NUMMI suppliers. For the suppliers participating in this project, there remains a level of uncertainty with regard to their future as a group. In 2007, Toyota decided not to start U.S. production of highly successful Toyota Prius at the NUMMI plant. Toyota also expressed a concern about the rising labor costs at the NUMMI plant and suggested the possibility of shutting it down. In August of 2009, Toyota announced that it would be discontinuing operations at the NUMMI plant. For these suppliers, the final strategy question remains, "How to survive with the loss of the NUMMI plant?" For the three NUMMI suppliers that did not start to diversify, this becomes an uncomfortable shift from the "proactive - what if?" to the "reactive - what now?" planning described by Collins and Jack (Collins and Jack 2009-3).

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