

Case Study

Questioning the Relentless Shift to Offshore Manufacturing

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Abstract

The last twenty years has seen a relentless shift to offshore manufacturing as retailers chase ever-lower labor costs. The results of this strategy can now be evaluated and we propose that some adjustments are in order. We analyze the case of a North American apparel manufacturer that has successfully emerged from a period of major change with a strong and strategic position in the apparel supply chain.

Griffin Manufacturing, Inc., is a U.S. garment contactor manufacturing athletic wear for major national and international brands. For a decade, the strategic goal of one of Griffin's major customers has been to eliminate U.S. factories, and to replace Griffin with offshore manufacturing. While 80% of the manufacturing has indeed moved offshore, a critical mass remains. This case study documents Griffin's survival through evolution in capabilities, technology, and especially attitude. The Griffin case study suggests that keeping a portion of the manufacturing onshore at an agile, quick response factory is cost effective: It increases sales and improves margins. However, the new relationship between the parties is much more complex and requires commitment on both sides.

The Offshore Crisis at Griffin

In 1990, foreseeing competitive offshore pressures, Griffin changed its mission to the production of athletic apparel, and working with a small, innovative company, Griffin produced some of the first-ever jogging bras. Griffin invested in new sewing machines and by 1993 was producing 20,000 garments per week. Since then, Griffin has steadily grown 20% annually to a current volume of \$20 million.

A dramatic change occurred in 1993 when our small, innovative customer was taken over by a large, multinational corporation that immediately attempted to move the manufacturing to Honduras. We can now look back on several cycles in which new managers visited Griffin with the goal of eliminating the last "irritating amount" of domestic manufacturing. After these meetings orders would abruptly fall to zero, but within weeks would start to flow

again. The usual explanation was that some “unexpected event” had occurred which necessitated "a few" quick response orders.

At first, the sewing that moved offshore was of basic styles. “Basics” are the ongoing styles in a few colors that sell all year round. It made sense to move these offshore because with just a few styles, the training machinery requirements were less. Also, what remained were fashion styles, and the response time for these was much shorter. Twice a year the design department created entirely new lines that involved managing colors through lab dips, constructing prototypes, making pattern changes to ensure correct fit, and producing sales samples. Griffin’s ability to respond quickly to these issues was an essential asset in meeting design department schedules. In addition, assigning fashion production to Griffin allowed the design department even more time for their activities.

However, our customer’s manufacturing department was indifferent to our relation with the design group, they simply saw the extra 'dollar-a-garment' manufacturing cost. It took considerable work on Griffin’s part to educate the senior management in the entire scope of their relation with Griffin.

The take over by the multinational corporation dramatically increased the overall production volume, as investments in advertising and infrastructure bore fruit. One line which began as 4 styles in black, white, oxford, and navy, soon evolved to include new styles and fashion colors, two fashion seasons per year, and a significant increase in garment complexity.

It became clear to everyone that our customer's forecasting was much more uncertain for fashion styles. A trend developed where the fashion seasons were divided into multiple deliveries, the first occurring just in time for the beginning of the season. Then, as early sales data accumulated, forecasts would be adjusted and new orders placed. Griffin worked very closely with our customer's analysts to mix and match fabric and garments, skews, and production to the emerging sales picture. Daily conference calls resulted in instant changes to cutting schedules and production runs.

Interestingly, retailers would frequently rapidly change their orders of both fashion *and basics* during the season. This resulted in quick response orders of basics, which also had to be sewn at Griffin.

Meanwhile, another strategic trend was emerging. The athletic wear business was becoming more competitive as marketing departments began to advertise products claiming that their fabrics made athletes run faster. The result was a dramatic increase in the diversity of fabrics, the number of styles, and the complexity of the styles themselves.

For a couple of years we continued to average 15,000 garments per week, but the fluctuations were huge, which was extremely disrupting to efficient manufacturing. Also, the gradually increasing complexity of the styles exacerbated the production flow problems.

We feared that the domestic production would eventually fall to zero, but by 1998, we had struggled to reach a new accommodation, as Griffin's share of production leveled off at 20%, with 80% going to Honduras. In concert with our customer, we had evolved a completely new business model, which is the focus of this case study.

Emerging Cooperative Relationship

Griffin's mode of operation gradually evolved to provide quick response manufacturing. This required significant investment in technology, including CAD for patterns and markers, automated cutting, and information system improvements including a factory-wide management information system. Concurrently, staff expertise grew to include planning and logistics. Also, Griffin began to take on the inventory of some fabrics to facilitate quick response.

While the number of sewing machine operators has remained essentially constant for a decade, the capabilities of the organization have changed dramatically. In 1990, Griffin employed approximately 200 sewing machine operators, producing 20,000 garments per week. Griffin still employs those operators, but now they only represent 20% of the garments we cut. Griffin cuts an additional 80,000 garments per week, packing and shipping the parts for assembly in Honduras.

Interestingly, we have always had a very close relationship with our customer's design team. They like the overnight turnaround for their prototypes and samples. Pattern changes are now exchanged via email. However, the relationship with their manufacturing department has not always been so smooth, and the evolution of our working agreement is an interesting aspect of this case study.

The Problem

To make this case study more specific, we will focus on a typical garment, a medium-range jogging bra. This particular garment was created in the early nineties to fill a specific market void. The business in high end, technically sophisticated, jogging bras was growing explosively. There was a niche for a less expensive version to sell in chain stores where price was a significant factor.

A Taiwan fabric was selected and the garment was to be assembled in Honduras, immediately exposing Griffin to both import and export issues. This particular bra has six minutes of sewing labor. The average labor rate at Griffin is approximately \$7.50 per hour, resulting in a direct labor cost around \$0.75. However, labor rates in Honduras are around \$0.29 per hour, for an assembly cost of \$0.03.

These are direct labor costs. Since overhead costs are typically at least twice labor costs, reasonable estimates for the total labor costs are: Griffin, \$1.50, Honduras, \$0.06.

Of course, transportation and logistics costs have to be added to the Honduras labor costs. Transportation is one of the great modern bargains. Filling a standard container with these bras, and shipping them to Honduras costs less than a penny a garment. However, even generously allowing for some additional costs, it is quite reasonable to assume that a savings of \$1 per garment is realizable. The basic question becomes:

If you can sew the garment in Honduras for less than five cents, why bother making it in the USA for \$1.50?

Griffin was averaging about 750,000 garments per year. This explains why from 1994 through 1998 the goal of our customer's upper management was to eliminate domestic manufacturing, and save \$750,000 per year. This goal became embodied in a simple slogan "Every time Griffin makes a garment, it costs us a dollar."

Formalizing the Solution

Over time, we gradually educated our customer about the value of permanently keeping 20% of the manufacturing in the U.S. Griffin's value was always obvious to us, but we had to learn to quantify it, to actively promote ourselves, and even to negotiate informal production agreements. The hard lessons for manufacturers are presented below.

The basic question remains: If you can save a dollar a garment by manufacturing offshore, why not make everything there? The answer has three parts, and we will look at each of these in turn.

- The Honduras cost of \$0.06 is not the real cost, there are many hidden costs.
- Fluctuations in consumer buying patterns, and retailers demanding instant response, stress the long production cycle times associated with offshore production.
- The costs of excess, unsold inventory can far exceed the savings from offshore manufacturing.

a) Hidden Offshore Costs

The Honduras labor cost of six cents is nowhere near the real cost. Operator efficiency is significantly lower than in the USA. This efficiency (slowly!) improves over time as operators learn and companies invest in new machines. Turnover in Caribbean factories can be very high, and rates of 40% per year are not unheard of. Staff turnover dramatically affects both throughput and quality. New operators must be trained until they can reach satisfactory production and quality levels.

Logistics problems arise continually, and additional, expensive staffs are required to manage the import and export of fabric and garments. A favorite Griffin example involves the garment labels that show the country of manufacture, as well as style information, bar codes, washing instructions, etc. These labels are frequently late because they require detailed information from several different departments, and coordination is notoriously difficult.

They are also small and tend to get lost. As a result, these labels are frequently express mailed around the world. Air mailing labels can be more expensive than the garment's labor.

There are also overheads that are not always correctly attributed to the manufacturing budget. A U.S. manufacturer that takes on a relationship with a factory in the Caribbean incurs significant overhead expenses as staff members travel abroad to correct problems.

While these costs are noticeable, they do not change the basic equation. The potential offshore savings are so great that considerable staff growth in logistics and significant inefficiencies in manufacturing can be absorbed. However, based on our Griffin experiences, we would warn companies not to be naive about the continual problems that arise in dealing with offshore production. It seems that managers frequently feel that each new problem is unusual, and once they get past it, they'll be alright. At Griffin we would recast that observation as, "The problem may be unusual, but there are always others, equally unusual, right behind it."

b) Fluctuating Demand – "The 500 White Shorts Problem"

There is a significant trend in the retailing industry towards instant delivery, which the following example dramatically illustrates. Late one Monday, Griffin received a desperate phone call and an emergency order for 500 white shorts with a 48-hour delivery schedule. Griffin had fabric on hand, and because we had often made this style before, the necessary infrastructure was in place: markers, trained operators, etc. We cut and sewed the shorts, shipping them out on Wednesday as requested.

While the order itself was not unusual, the stress and concern expressed by our customer was. We began to investigate the order and eventually, the economic analysis of the "500 White Shorts" problem provided us with the first *quantifiable* cost justification of our quick response manufacturing capability.

Our customer had received an order worth \$950,000, but the delivery date was only 5 days later. What made this particular order unusual were the conditions: Either every item had to be completely fulfilled (i.e., every style, color, and size) or nothing was to be shipped. Inventory analysis showed that the only items not in stock were 500 white shorts. Hence, the desperate phone call and the emergency order.

Remember that we were constantly being measured by the slogan "Every time Griffin makes a garment, it costs us a dollar." And yet here was a case where our customer could generate almost a million dollars in sales *only because Griffin was around to make the 500 white shorts*. The extra cost of one dollar per garment (\$500 in this case) was inconsequential compared to the opportunity to generate \$950,000 in sales.

After some discussion, our customer did in fact analyze their sales to determine the number of such occurrences, and their value. From Griffin's perspective the results were extremely encouraging. They estimated that between 5 and 8 times a year, one-shot, fast turnaround orders arrived with a value of \$8-\$10 million, and accounted for some 10% of sales. However, that 10% of sales was seen as critical because it frequently represented new accounts or new

distribution channels. Also, sales growth is an extremely important goal in their corporate hierarchy. After further analysis they concluded that they could "afford" 500,000 garments per year at Griffin, and this became the baseline for our mutual agreement.

For the first time, Griffin had found a cost justification to help move our customer away from their goal of manufacturing everything offshore. When they argue that we cost them a dollar for every garment, we now reply 'Yes, but without us you wouldn't make your sales goals.'

c) Forecast Errors

It is not unusual for both retailers and manufacturers to make a 25% error in the sales forecast of a significant percentage of styles. The forecasts for basic, ongoing styles are usually rather better than this, but forecasts for fashion items are notoriously much worse.

The following example illustrates the dramatic impact of forecasting errors. Suppose that the sales forecast for the above, mid-range, jogging bra is 1,000 units. The current trend of manufacturing everything offshore means that an order for 1,000 units must be placed some 6-9 months in advance. It is only when the season begins that the true customer demand is realized.

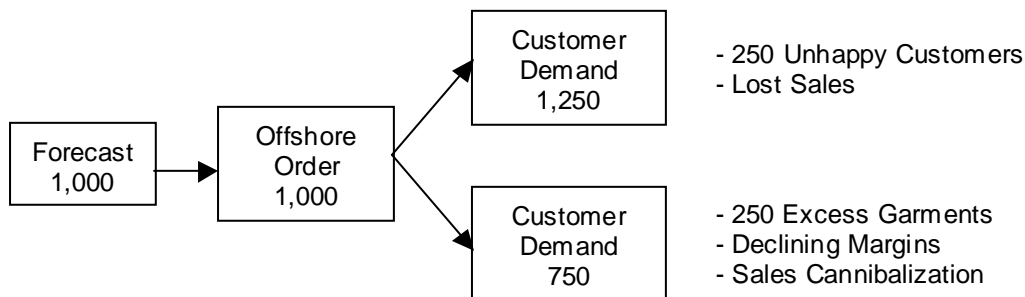


Figure 1. The consequences of forecast errors.

The results of a 25% error in a forecast are summarized in Figure 1. If the demand is high, the store will not have the inventory to satisfy their customers. Not only will the store lose sales, they run the risk of turning off the customers who came to buy.

If the demand is low, the store will be left with excess inventory. Some excess is acceptable because the store can draw in customers with sales and discounts. However, the overall result is very costly. Again using our jogging bra data, the store purchased 250 extra garments at \$10, therefore accumulating \$2,500 of excess inventory. It is interesting to compare that excess to the labor savings from offshore manufacturing. We used the benchmark of \$1 per garment in labor savings, so the manufacture of 1,000 garments offshore saved \$1,000, significantly less than the \$2,500 excess inventory.

Suppose the store offered a two-for-one sale. They might argue that they will at least recover their wholesale cost. However, the overall margin for that style declines. There is also a

hidden cost associated with selling the excess inventory at a discount. A customer who buys two items does not need to come in next season to buy another one. We refer to this "cannibalization of sales." The conclusion from this brief overview is that forecast errors can be much more costly than the savings from manufacturing offshore.

The New "Agreement"

Despite the dramatic potential cost savings from offshore manufacturing, Griffin still manufactures approximately 20% of the volume in the USA. However, it has been a struggle to educate our customer to the quantitative value of quick response, domestic manufacturing. We finally evolved a working relationship in which we are somewhat less than legal partner, and yet more than just a vendor.

The agreement is real, if imprecise. They attempt to provide us with orders of about 10,000 – 15,000 garments per week. We agree to make whatever they order. In addition, we provide a whole range of (non manufacturing) services that they need, but on which we make little or no money. In other words, we maintain an entire infrastructure that they can call upon, and in return, we get a manufacturing base that can support the infrastructure.

Over time, at Griffin we came to think of ourselves as a Quick Response manufacturer. To support that idea, we have invested significantly in infrastructure improvements. The schedule of technical investments at Griffin were:

Year Innovation

- 85: Piece work rates, bar codes for sewing operations. Garment time studies for cost estimation, pricing, and payroll.
- 90: Beginnings of MIS. Scheduling system to manage production. Computation of weekly sales goals.
- 92: Embroidery machine, first diversification
- 93: CAD system for patterns & markers. Automated cutting.
- 94: Evolution of MIS to include management of schedules for imported fabric. Offshore Logistics capability.
- 95: Bills of Materials for costing & pricing.
- 96: Purchase order & Inventory management system.
- 98: Database of garment costing operations
- 99: Quality fabric inspection functions
- 00: Continuous fabric & trim inventory.
- 01: Work scheduling for Caribbean plants

The introduction of CAD and automated cutting allowed us to grow the number of garments we cut from 20,000 to 100,000. Also, an automatic cutting machine doesn't care how complicated the pattern is, which immunized us against some of the increasing garment complexity. Automated cutting also improves sewing quality, since every cut part is identical and the operators do not have to adjust the pieces to match.

Automated cutting required computer aided design of markers, which also significantly improved our fabric utilization efficiency. We saved one customer over \$1,000,000 in fabric the first year that automated cutting went into production.

Griffin's "Attitude Adjustment"

Along with the changes in technology, a significant evolution in Griffin's management philosophy also had to occur. We viewed ourselves as "in competition" with the Honduras factory, and resented every unit that went abroad. Eventually, we came to realize that we could never compete on price, but that we did have a legitimate and cost effective role. We evolved to think of ourselves as a Quick Response manufacturer. The days of large, stable production runs have disappeared, but the reality is that we can survive by teaming with a customer and quickly adjusting our production schedule to meet the instantaneous demand.

Once we realized that there we could quantitatively justify our existence, we understood better which customers we wanted to team with, and which jobs we could realistically compete for. We also set about educating our customers about the kind relationship we required, and specifically sought out customers willing to develop a long-term relationship.

We continue to invest in technology that expands our capabilities, aiming to provide a full line of services once a garment design is created. However, with all customers we stress that there must be a base level of manufacturing at Griffin, or we are not interested.

Further, providing a broader range of services gives us some flexibility in pricing. s. For example, by taking on the fabric inventory, and providing a full package price to a designer, we have much more flexibility and can often hide some of the expensive labor costs.

With package prices, we have found that it is often possible to satisfy our customers' price goals with a mixture of domestic and offshore manufacturing. We can then offer services that designers like (quick response to design changes, sample production, etc.). Customers are also attracted to the idea that a certain proportion of garments can be manufactured locally with quick response. They can increase sales by responding to surges in demand. Our survival strategy is summarized below:

Management Philosophy

- Willing to invest in new approaches
- Willing to manufacture 20%
- Seek teaming arrangements.
- Cooperate with Offshore Manufacturers What's in it for us?
- Willing to make any style (within reason)

Directed Investment

- Invest in Management Information to handle complexity
- CAD for complexity of styles
- Variety of styles requires automation

Product Selection

- Forget “T” shirts
- Look for new fabrics and products
- Efficient yield for expensive fabrics

The New Model

The changes at Griffin provide an example of an interesting new model. One cannot stop the trend to offshore manufacturing. However, the case can be made that there might be a valid, long term, survival strategy when offshore production levels off at about 70% - 80%. The new strategy is based on the following observations:

- A significant portion of orders requires “instant” response.
- Forecasting accuracy is quite poor for a significant percentage of styles.
- Excess inventory is very expensive.

Therefore, we propose dividing production between offshore and onshore, and immediately emphasize that we are not proposing to send some styles offshore, but dividing up the production of *each style*. The process begins with a sales forecast for every style. Then, most of the production is assigned to an offshore facility. Since offshore production is less expensive, the amount produced there should be as much as possible.

On the other hand, since forecast errors result in excess inventory, which is very expensive, we propose not to assign the entire forecast offshore. When the season begins, and actual customer orders occur, we make projections for the final sales. In concert with a domestic manufacturer, new orders are placed to meet the new demand. The situation is summarized below in Figure 2.

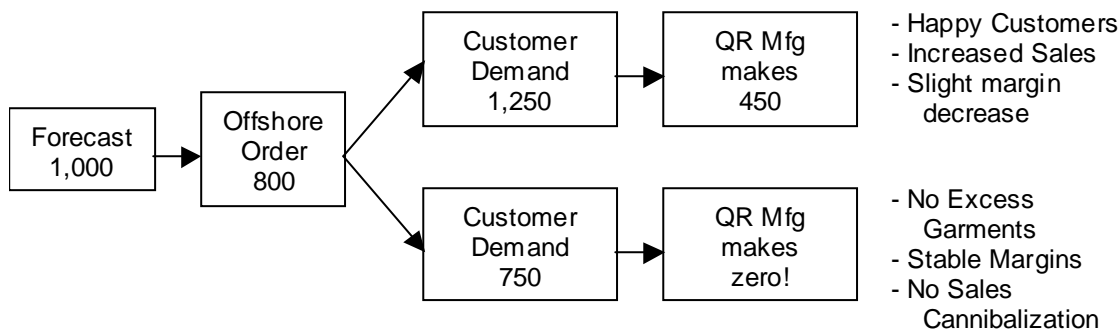


Figure 2. The quick response case.

Retailers and manufacturers should be encouraged to analyze their forecast history and assess which styles are likely to have inaccurate forecasts. For products with risky forecasts, it is reasonable to assign a lower percentage offshore and reserve capacity at a quick response manufacturer. On the other hand, for basic styles that sell throughout the year, a much higher percentage can be assigned offshore.

There is a clear case that for typical forecast accuracies, the margins for a mixed offshore-onshore production strategy is competitive with the offshore only case. (Warburton and Warner, 2000) Margins improve and sales increase because the quick response manufacturer can take advantage of the early sales information to produce more of the styles the customers are demanding.

Sharing the Pain

There are a number of challenges associated with the proposed strategy because it is a much more complex and uncertain approach. Rather than simply ordering to forecast, the retailer or manufacturer has to analyze forecasts, decide on offshore commitments, and team up with a domestic manufacturer.

When sales increase, everyone will be satisfied. The retailer sells more products with fewer markdowns, resulting in less excess inventory. Also, the manufacturer can make minor adjustments (e.g., fill in sizes) to further tailor the inventory to the actual demand. Finally, there will be less cannibalization of future sales.

However, there is a much more difficult issue that must be addressed early on in the teaming arrangement: If sales decline, the temptation for the retailer is simply to order nothing from the domestic team member. If that happens, the domestic manufacturer ceases to exist. It is important for the retailer to realize that they are trading capacity for inventory. By ordering 80% from offshore, the retailer is asking the domestic manufacturer to reserve the other 20% as capacity. If the forecast does not materialize, then the retailer is obligated to fill the capacity with some type of manufacturing.

The challenge for both parties is to find something that fills the reserved capacity and yet is cost effective for both parties. In the above situation, Griffin's customer occasionally assigns black or navy jogging bras or shorts to fill the manufacturing voids. These basic items sell all year round, and represent a small inventory risk. There are other strategies, including starting a season's manufacturing early. Finding those fill-in items is a challenge to both parties, but the partnership cannot survive unless the challenge is met.

Retailers undoubtedly recognize that forecast errors are expensive. This new approach shows that planning to deal with them can be cost effective. In the past, retailers sent orders to manufacturers with no thought of working with them on the actual demand. An adversarial relationship often developed as each party pursued their individual goals. In the new, proposed approach, a genuine partnership has to evolve.

Protective Inventory and Protective Capacity

We can tie this case study into several emerging supply chain trends. Hill developed the original work on trade-offs (Skinner, 1969) using the classic process choices of jobbing, batch and line. (Hill, 1998) Although there are many hybrids, this simple classification provides an

understanding of the nature of business decision-making, namely, that trade-offs, or conflicting performance variables exist and need to be acknowledged in the marketing-manufacturing alignment.

At Griffin we do not take on New Product Development, which typically requires a fast response, jobbing process. Agile Manufacturing, or "Jobbing," is usually thought of as requiring a manufacturing set-up for each new order. (Agility is associated with a supply chain that can accommodate both a non-standard product and instability in demand.) At Griffin, although the styles change from day to day, the operations do not. By specializing in athletic wear, operations such as setting elastic and flatlock seams are constants. The precise details of the styles at the set elastic machine may vary slightly, but there is no set-up in the jobbing sense.

Also, by establishing a minimum manufacturing size of around 1,000 units, we keep the factory reasonably efficient. At Griffin we describe ourselves as Quick Response (not agile) manufacturers. The volatile forecasts limit the use of protective inventory. On the other hand, Griffin's protective capacity enables the flow.

T-shirts represent products that are poorly suited to Griffin. They represent a low cost, non-fashion item, and therefore the value of the finished inventory buffer is low. At the other end of the spectrum, high value fashion products are sensitive to both forecast variation and obsolescence. The requirement for fast response to consumer buying patterns puts emphasis on protective capacity at Griffin. However, it is important to note Griffin's arrangement to fill the excess capacity when demand is low.

The Honduras operation competes on price but requires protective inventory, which is due to location as well as process focus. The development of lean manufacturing and subsequently lean thinking (Womack & Jones, 1996) emphasises the elimination of waste across the supply chain and the role of incremental inventory reduction in exposing sources of waste. Lean operations are most closely associated with a stable product range and level scheduling. Production in Honduras is characterized by level scheduling of lines devoted to single products, and presumably, the application of lean thinking is appropriate there.

Griffin competes on delivery speed, but requires protective capacity to accommodate the demand uncertainty. The trade-off can be viewed as protective capacity versus protective inventory. In the longer term, Honduras should increasingly focus on developing lean operations where price is an order winner with minimal WIP inventory.

Relating the concepts of *lean* and *agile* to process choice helps to present these topical concepts as extreme points on a continuum rather than separate paradigms. This presents *lean* as a development most suited to the stable, line production end of the continuum focused on eliminating waste, and where price is an order winner. At the other extreme, *agile* is associated with product variety and demand volatility, and where responsiveness is an order winner. The process continuum between these two extremes is demonstrated by Griffin's definition of a hybrid (Quick Response) with elements of both.

Conclusions

We conclude that domestic, high wage, manufacturers can make the case that they have a legitimate and cost effective role. However, the role of quick response depends on seeking out teams, getting involved in forecasting, reducing the production cycle time, and sharing of data throughout the supply chain. Therefore, to survive, a modern domestic contractor must invest in the technology required to sustain a quick response capability.

The Griffin case study demonstrates the important link between sales forecasting accuracy and the need for quick response manufacturing. If retailers and manufacturers examine their history of forecasting errors, they can predict how much domestic manufacturing they will need, for which types of styles, and when it is cost effective. Using a domestic contractor as an integrated partner can financially reward all members of the team. However, to make the partnership work requires extensive planning and cooperation, and at all management levels of the partnership.

Using this case for guidance, we anticipate that a retailer teaming with a quick response manufacturer would have lower inventory, and yet still have the stock to satisfy more customers with fewer markdowns. The manufacturer should see increased margins and lower inventories. The offshore contractor's production can be smoothed out, a significant benefit when considering the typical fixed commitment, offshore contracts.

The use of the concepts of protective inventory and protective capacity provide useful parameters for linking this lean-agile continuum. Griffin finds useful the idea of our customer trading protective inventory for protective capacity. It is an important insight that clearly indicates the resource implications in providing the response capability.

We began by noting the relentless trend to offshore manufacturing, and asked if domestic apparel employment will inevitably fall to zero. We can now begin to answer the question. One survival approach for domestic manufacturers is to aggressively seek out cooperative ventures with retailers, and even offshore contractors. To survive, domestic manufacturers will need to invest in the technology that ensures the role of quick response manufacturing is within their grasp.

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