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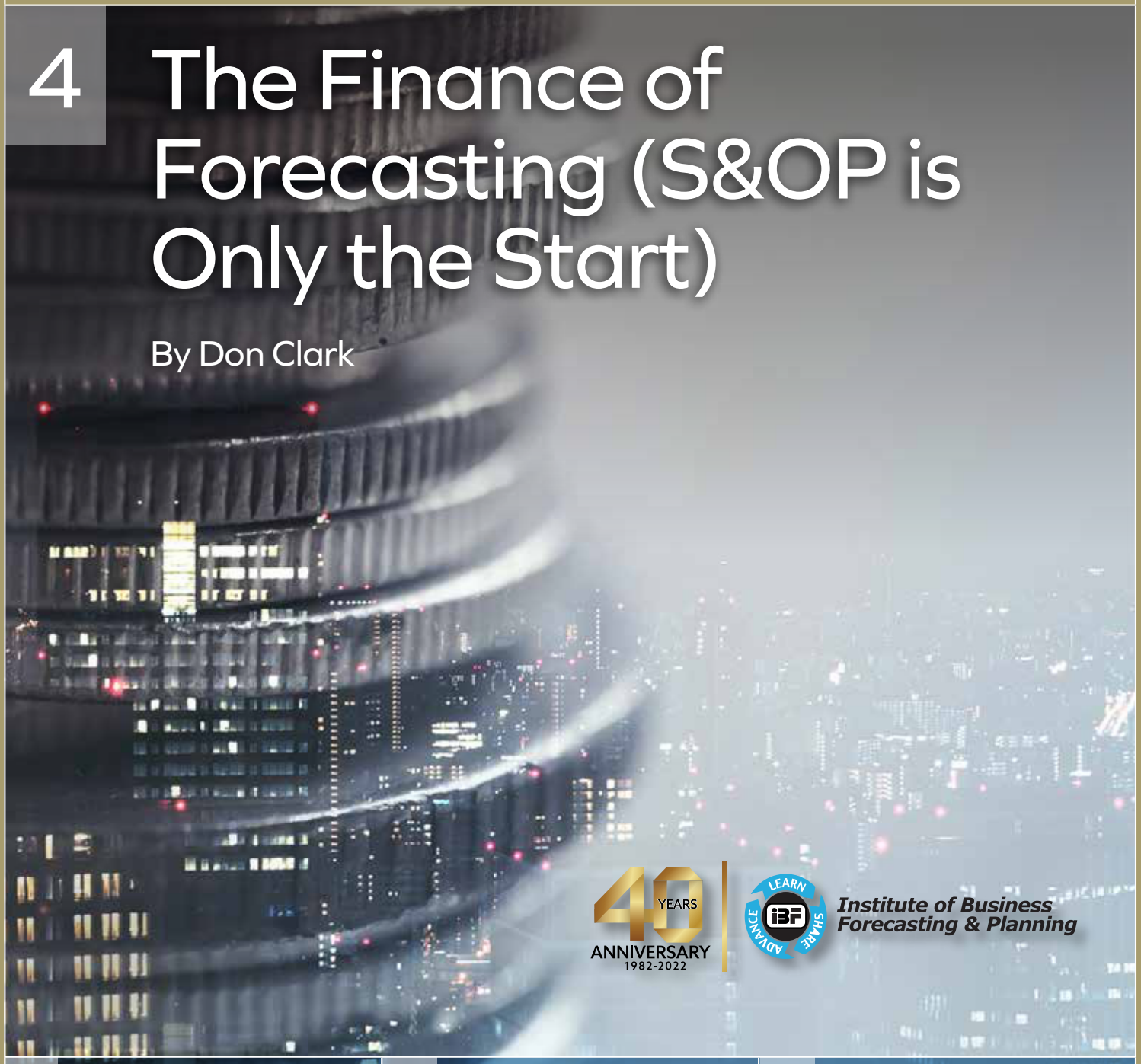

4 The Finance of Forecasting (S&OP is Only the Start)

By Don Clark

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Answers to Your Forecasting Questions

[Q] I would like to ask whether Statistical Forecasting is still relevant, considering the past 2 years of data is heavily influenced by COVID related shutdowns, global components shortages and logistics issues. Judgmental forecasting seems to be more 'accurate' than statistically driven forecasting.

[A] I understand your predicament. Despite the abrupt changes in market dynamics, statistical modeling still holds, only it requires a change in the data to be used effectively. When the pandemic started, demand for certain products went through the roof while demand for others went down. When we look at the data it may look like an anomaly but in reality it is part of new phenomenon, an emergence of new data pattern. For the first 3 or 4 months, perhaps, it may not be clear whether it is an anomaly or a new norm but, after a while, it should become clear that it is a new norm and we can once again use statistical models. So, in the first 3 or 4 months we may be using judgmental forecasting but after that, statistical modeling should start working as before.

Now, we are again seeing a change in demand. The pandemic is pretty much under control and demand for casual clothing, for example, has started declining and demand for formal wear has started picking up. Again, we need to ignore the previous data and start applying statistical models to the current data. Pandemics are nothing but turning points which are difficult to predict but, once the new pattern is well established, we can again start using statistical tools for forecasting.

[Q] I am confused about statistical bias and forecasting bias. What is the difference? Also, how is forecasting bias estimated?

[A] There is not much difference between statistical and forecasting bias. Bias in statistics is referred to a tendency of a statistic to overestimate or underestimate the population parameter we are trying to measure. In the forecasting context, we try to measure whether the model we use tends to over- or under-forecast. Both are costly. It is measured the same way as MPE (Mean Percent Error), that is, using an average of absolute percent forecast errors.

[Q] Do you have any advice on forecasting during economic downturns?

[A] The most important thing in forecasting is to find a trend, which is even more important during a recession. History tells us that the duration of a recession is getting shorter and shorter. To make the most of limited data, we need to know quickly how a certain product is trending. Here are two things we can do.

One, update forecasts weekly instead of monthly. With that, the level of accuracy will deteriorate. The best way to deal with it is to see if most SKUs are moving in the same direction as their category. If they are, the trend we are observing is real. Otherwise, we need to be a little cautious in using that information. These days companies like Coca-Cola review some of their high value products even daily.

Two, concentrate only on a few high value products. In most businesses, a large percentage of revenue comes from just a few products.

Happy Forecasting!

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The Finance o
(S&OP is Onl

EXECUTIVE SUMMARY | We all know that S&OP requires the involvement of Finance but in many organizations this function can feel detached from the core S&OP functions of demand and supply. Make no mistake, though, the financial context of a company underpins the entire planning process and is key to keeping demand and supply planning aligned with financial constraints, company goals, and strategy. In this article, I invite planning professionals to walk a mile in Finance's shoes, revealing the priorities and core responsibilities of this function, including how they must represent the voices of management, ownership and, if applicable, the bank, in the S&OP process. I also discuss how Finance can add value to the S&OP process (and the enterprise as whole) by revealing the impacts of planning activities on cash flow, margin, and P&L, and more.

DON CLARK | Don is an experienced Finance professional specializing in FP&A, continuous process improvement and development and integration of financial information systems. As Finance Director, Don leads the financial and strategic planning at Bookbyte through a collaborative commercial team to drive sustainable financial growth and strategic progress. Don has over 17 years' experience in FP&A and accounting having held Financial Analyst and consulting roles at Oregon Scientific, XPO Logistics, and Levi Strauss. He holds an MBA from the University of Phoenix and a BS in Business Administration from Warner Pacific College.

f Forecasting y the Start)

By Don Clark

The standard S&OP process is a critical collaboration between sales (demand), production (supply) and leadership. However, when you look over the entire organization, key functions are frequently not represented such as Marketing, Finance, and others. While supply and demand are at its functional core, they exist within a greater context that is underpinned by Finance. Having a broader understanding of the financial environment in which S&OP decisions are made is key to an integrated and mature planning process.

THE FINANCIAL CONTEXT

Demand planning and the S&OP process are tightly focused on inputs and outputs. What is increasing or decreasing demand? What factors are impacting supply? How is competition impacting pricing and margins? While these questions are important, sole focus on these fundamental components can obfuscate a larger context in which the business operates. Other business concerns exist that are dependent on the S&OP process including some that are 'top-of-mind' items for Finance professionals. The term "voice of the customer" is a common phrase used in business and, for the finance professional, these "voices" are specific to key stakeholders: the owner(s), the bank, and management.

THE OWNER(S)

The voice of the owner is shaped by three main factors: ownership composition, ownership priorities,

and owner involvement.

Ownership Compositions: These vary from a single proprietor to limited partnerships to publicly traded companies with thousands of stockholders. Each of these ownership types present their own unique characteristics and challenges. Levels of access will vary from direct access and communication with a single proprietor to very limited access in the case of a corporate board of directors. Regardless of the challenges presented by limited access and communication, Finance has a responsibility to represent and convey those concerns and interests as they work alongside their functional partners within the company.

Owner Priorities: These take on different forms. Excluding non-financial considerations, owners are looking to increase the return on their investment in different ways. Some owners are very focused on short-term returns such as cash flow to see how quickly they can break even or a positive cashflow to finance their lifestyle or other investments. Other owners are focused on long-term growth of equity and/or overall business valuation. Their strategy is focused on building up a business as a long-term investment or for future acquisition. Finance's role is to ensure the focus of the owner is reflected in both the presentation of information as well as strategic alignment.

Owner Involvement: This is an outcome of ownership composition. Under sole proprietorship, and even limited partnerships, direct involvement by the owners is extensive as they take an active role in the daily operations of the business. In larger businesses, less direct involvement at all levels of the business by the owner is common. The role of Finance here is to assist the owner in getting the information they need to make decisions in the format and frequency they prefer. The voice of the owner in cases of more direct involvement is very apparent, so Finance is in more of a supporting role.

THE BANK

While the voice of the owner permeates all levels and areas of the business, the voice of the bank is isolated to Treasury and/or Finance functions. However, the implications of financing structures touch all parts of the business to some extent. Managing the requirements of financial terms and conditions requires coordination and communication with many functional areas who either contribute to, or are impacted by, these financing facilities. With that in mind, there are three main points that help to better understand the realities and requirements of financing.

Risk: While the business focuses on positive performance measures such as profitability, growth, cost control and equity, the bank uses these measures to determine the degrees of risk to the bank. The responsibility of Finance includes monitoring the cash and assets on which the collateral is based to ensure that the bank is satisfied relative to the financing.

Limited Understanding: Where many businesses only work with one bank, banks serve many clients. The result for the bank is that they have limited time and resources to dedicate to deeply understanding the business of each client. In consideration of this, Finance needs to clearly understand what information is important to them and mirror that focus through our analysis.

Covenants: Most financing facilities include requirements by the bank that the business maintain minimum performance standards. These focus on the business's ability to maintain sufficient free cash flow and equity, manage the collateral, and other financial measures. These requirements may in some cases constrain the company's ability to spend cash at certain times, limit the ability of the owner to access equity, and so on. For businesses that are highly cash sensitive, coordination with production, purchasing and sales to monitor and manage cash flow is critical.

THE MANAGEMENT

Finance works within and around management of the business but is uniquely positioned to interact with many, if not all, functional areas of the business. As such we have an opportunity serve as their eyes and ears. While individual managers have concerns specific to them, most in management have two main concerns: "What am I responsible for?" and "What is expected of me?".

To support their concerns, we look out for situations or developments that will impact their departments that we can bring to their attention. We also look for ways that we can assist management in supporting what they are responsible for and/or expected of. Finally, Finance is presented with opportunities to assist management such as determining financial requirements for new ideas, projects, or initiatives.

These voices are always present and shape the lens through which Finance views the S&OP process. More than just another seat at the table, Finance has the ability and

responsibility to inform, advise and contribute to the S&OP planning process beyond what is obvious to those native to S&OP.

HOW S&OP CAN SUPPORT FINANCE

One of the best pieces of advice I received regarding my work in Finance is to "Know your business". This means getting beyond the financial statements, models, and ratios to really understand the nature of, and details within, the various functions of the business. To this end, the subject matter experts within S&OP are a tremendous resource to those of us in Finance.

Educating and informing your Finance person in the realities and nuances of your functional area can pay massive dividends. In so doing, you can become a true business partner to those in Finance and other functional areas as well.

HOW FINANCE CAN SUPPORT S&OP

As mentioned before, Finance has the ability and responsibility to inform, advise and contribute to the S&OP planning process. We can accomplish this in several ways.

- Leveraging our exposure to a wide range of functional areas, we can help facilitate cross-departmental collaboration
- By bringing a fresh perspective we can ask probing questions to get to the root cause or key concept of a topic or situation
- We can provide feedback on the financial impact of their business decisions including things like cash flow, margin, and P&L impact as well as implications for financial covenants
- Incorporate financial constraints to long-term projections or forecasts
- Help align to key financial metrics
- Advise on exploring new opportunities

Nearly every business decision has a financial component or impact and that's where your local Finance person can add value and support.

KEY LEARNINGS FROM AN INTEGRATED APPROACH

About two years ago my company went through a restructuring of our teams where departments were reorganized, and a new group was created which we call the commercial team. The idea was to bring together the three legs of the stool on which the business operates: Supply, Sales, and Finance. With the managers of Purchasing, Sales, and Finance, our objective was to more closely align our work to improve controls, functional and market performance, and financial results through continuous improvements. We work and collaborate continuously together instead of just within recurring S&OP process cycles. Together, we do deep dives into each other's functional areas to discuss issues and gain a better understanding. We are collectively responsible for all commercial operations and performance of the business and this shared responsibility fosters greater levels of teamwork than what you might normally expect from a siloed departmental structure. While not all businesses can replicate this commercial team approach in the same way we have, the principles foundational to this approach can be applied and the benefits can be realized.

The point is that the S&OP process should be just the start of a journey towards a deeper and more collaborative planning process that both digs deeper into each aspect of the business as well as expands beyond the traditional functional areas to incorporate and consider the broader implications. Of those, the financial considerations of the owner(s), the bank, and management are a great place to start.

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We Were Already Broken — How Supply Chains Were Primed For Failure Before COVID

By Patrick Bower

EXECUTIVE SUMMARY | COVID, with its massive disruptions to both demand and supply, revealed critical shortcomings in supply chains. What is often overlooked is that while we couldn't necessarily have predicted the pandemic, we had engineered our supply chains in such a way that COVID's impact was far more severe that it needed to be. Overly lean inventory policies, over-optimized supply chains, SKU proliferation, inflexible production, and BOM complexity meant that we had no slack in our supply chain and operations to handle major demand or supply disruptions. In this article I describe how we as a discipline were already primed for failure and that COVID merely lit the fuse. I intend for this article to document the failings of our discipline in reaction to this event so that we may better prepare for the next, inevitable disruption.

PATRICK BOWER | A frequent writer and speaker on supply chain subjects, Patrick is a recognized demand planning and S&OP expert and a self-professed "S&OP geek." He has worked at Director and Sr. Director level in a range of demand planning and supply chain roles, with experience at Cadbury, Kraft Foods, Unisys, and Snapple. In addition, he has worked for the supply chain software company, *Numetrix*, and was Vice President of R&D at *Atrion* International. He was recognized four times by Supply and Demand Chain Executive magazine as a "Pro to Know," and Consumer Goods Technology magazine considered him one of their 2014 Visionaries. Patrick is the recipient of IBF's Excellence in Business Forecasting and Planning Award. He currently works at Aceto, as Sr. Director of North America Supply Chain.

I have spent a lot of time the past few years offering my insights on COVID and the supply chain impact of this black swan event. I do this with intent — as a form of contemporaneous documentation. I believe at some point in time — after COVID becomes endemic — that case studies and the like will look

to the collective observations from the COVID era to help future supply chain leaders figure out the best next steps. After so many articles and media stories on the reaction to and aftermath of COVID, it seems like a good time to flip the script and reflect on some observations about the pre-COVID supply chain.

Borrowing a favorite quote from the philosopher Spinoza, "If you want the present to be different from the past, study the past." Importantly, if we do not examine the flaws and fallacies in the pre-COVID supply chain, we are destined to be stuck in an endless loop of crisis and recovery. I posit that the North American supply chain was exceptionally weak prior to COVID. You might even say we were already broken.

From a process perspective, as I wrote this article, I made sure that I also talked with my peers, (six in total) as I've done extensively since the outbreak of COVID. This allows me to expand the thoughts conveyed beyond those unique to me or the organizations I have worked for. Further, I also asked three additional folks to peer review my first draft of this article to assure completeness. It is important to get this discussion right.

I was very surprised that my peers shared remarkably similar perspectives. And while the degree and type of "brokenness" manifested differently across industries, what we all found was that a similar series of layered events led to a gradual weakening of the North American supply chain. We collectively (and separately) observed the quality of our supply chains slowly erode over the past decade, if not longer. And because none of these erosions were landslides, we went about our business to fix or compensate for this weakening by making smallish corrections to help adjust to the challenges. In hindsight, it is now obvious that larger-scale structural deficiencies were afoot that would eventually lead to the total capitulation we experienced during the pandemic.

So, how did this erosion manifest itself? What exactly did we see in the pre-COVID days? There is no short answer. There were numerous gullies that began to form, varying a bit (but not significantly) between industries. For those in consumer goods, one of the most obvious struggles was the increasing difficulty maintaining our OTIF performance. And nearly all my peers (across many industries) reported lead time responsiveness issues with vendors, as well as increased lead times for raw and pack items. There were also more frequent failures relating to inbound deliveries, more driver time-outs and missed appointments, and less resilience in the wake of natural events like winter storms and hurricanes. International shipments became less reliable.

The infrastructure of the North American supply chain felt out of sync; it "felt" unbalanced and fragile. As I look back to the time prior to COVID I see plenty of signs, it was just that few if any of us weaved them together to recognize any sort of broader problem. We all felt the supply chain getting longer — in large part due to offshoring but also due to a slowing of the transportation network. I found myself problem-solving and expediting more over the last five years than in the entirety of my career up to that point. So, while it was clear the supply chain had objectively gotten more complex and challenging to manage over the years, most of us expected to eventually catch up as we mastered each new problem set. I know I did. Unfortunately, the supply chain did not stabilize prior to the tsunami that was COVID hitting with such brute force.

The example I use most often to describe my own personal 'aha' moment pre-COVID was literally a polar vortex named Thor. I believe it was in 2015 that Thor dropped ice in the Midwest on and off for about 10 days, effectively shutting down most cross-country carriers and some rail traffic. Previously, a natural event like this would impact the transportation network for about a week, then things would simply reset. In the case of Thor, it took five to six weeks to recover, exposing an absence of slack capacity in the network — we lacked resilience (in the number of drivers, equipment, and storage facilities) required to readily overcome a relatively small disruption. At the time, my Walmart OTIF scores plummeted and took a couple of months to normalize to their prior performance levels. Thor got my attention.

There were plenty of other examples. It seemed each major hurricane or snowstorm represented an opportunity for a performance departure. As in the wake of Thor, though, the effect was transient. But with each new instance, the inherent weakness in the transportation sector was becoming more obvious. In my case, multi-week service departures began to occur often enough that I was forced to carry more inventory during hurricane season because I could not trust the transportation network to bounce back in a timely manner.

Over the last decade, warehousing became a real issue. We noted the rise of labor shortages and turnover at warehouses while at the same time warehouse space became both

scarce and expensive. We struggled to find space. We noted the backup of trailers and containers in warehouse yards. Some blamed Amazon for gobbling up all the warehouse space; others thought it was a hangover from the Great Recession. Regardless, it was clear the pre-COVID problem set was not unique to the transportation sector. For many reasons, warehouse capacity was already very tight prior to COVID's onslaught.

What is frustrating to me now is to hear the media (or worse yet, politicians) weigh in on the reasons for our collective supply chain woes. Yes, demand has increased. Yes, there was an initial bullwhip. Yes, the ports have increased volume. Yes, we have offshored a lot of production. Yes, some industries inappropriately used just-in-time inventory approaches for strategic, high-risk components. But the supply chain disruption is not just about COVID-related illnesses impacting production, or throughput, or the increase in demand associated with consumerism, or port berths, or driver shortages, or just-in-time flow control, or the extended supply chain due to globalization. It is also not just a failure of risk management processes, or supply and demand variability issues. These are real concerns, and certainly contributing factors, but the challenge we're confronting now is bigger than all of the above. It is about the original premise — the North America supply chain was already very fragile.

So, what caused this fragility? There are about a dozen pre-COVID contributing factors that start to get to the "why". Some are external or regulatory issues, some are unintentionally self-destructive, others reflect best practices gone wrong, and still others trace back to changes in customer expectations. We dug into the why. Why were warehouses full? Why was the logistical network under-resourced? How come our production resources could not flex to changing demand? Why was there no slack in the supply chain when it was desperately needed? Here are the observations.

THE GREAT RECESSION AND RECOVERY

In simplest terms, the Great Recession triggered a contraction in warehouse and transportation capacity as well as capital spending, and it reduced the total number of operators — both warehouses and carriers. Most logistics and transportation providers took a huge hit during the recession, and when the economy began to expand at the outset of recovery, those operators who were still standing cautiously expanded their resources, though this left them behind the curve when warehouse and transportation requirements surged. So, while the Great Recession did not cause the COVID capitulation, cautious expansion by transportation and warehousing operators in the decade prior to COVID helped set the stage for subsequent failure. No doubt, more warehouses, carriers, and drivers would have helped during the crisis.

CHANGE IN HOURS-OF-SERVICE RULES

In 2013, changes in these rules coupled with electronic logging requirements reduced capacity in the transportation network and exacerbated already simmering issues relating to the shortage of qualified drivers. Some of my colleagues estimated that the rules changes took somewhere between 15-25% of capacity out of the transportation network, creating a step-change decline in on-time delivery statistics and sending many manufacturers scrambling for solutions to improve these metrics. I was not alone in managing the dramatic decline in on-time performance that accompanied this change. Of course, no one will argue the safety concerns that drove such change, but it did weaken the responsiveness and performance of the network by practically eliminating all slack capacity within the transportation network. This deficit showed up immediately in our OTIF measurements, but it was truly magnified years later with the outbreak of COVID when healthy drivers were in short supply and we could have used the additional slack capacity.

CHANGE IN ON-TIME, IN-FULL REQUIREMENTS

The gradual (and not so gradual) tightening of these requirements by big box retailers and e-tailers over the past 10 years forced many manufacturers to find any workaround to help offset the onerous 2-3% off invoice fines levied by retailers. It pushed more of these same manufacturers into expedited and premium freight options, or into warehouse expansion or pooling when capacity for each was already being pushed to the limit. And the 100% fill requirements of most of these retailers forced manufacturers to carry more finished goods inventory, further constricting the already limited amount of available warehouse space. Of course, the benefit to holding vendors accountable for

OTIF measures was that it allowed retailers to carry less inventory. Yet in hindsight, more inventory at retail would have helped buffer against the demand and supply disruptions during COVID .

But here is the problem: 100% OTIF has never been considered a pragmatic supply chain goal; and eventually the 100% in-full requirement became a signature ingredient in our already simmering recipe for disaster.

LEAD TIME CONTRACTION

There once was a time when suppliers who were having difficulties delivering product to a customer could call them up and request a reasonable lead time extension. This practice waned over time as retailers took the lead by mandating arbitrary decisions about lead times, often telling manufacturers what their lead times should be. Most of these decisions were based around average in-transit times and did not factor in the potential for weather-related delays. And because these lead times were often arbitrary (and sometimes irrational), managing exceptions around them required the use of "guaranteed" transportation providers thereby siphoning off valuable capacity from the already struggling transportation network. Lead time reductions often lead to inventory reduction benefit, and cutting lead times made the supply chain technically a bit more efficient but it forced us to operate at "near perfection," leaving no margin for error to allow for even mundane variations let alone catastrophic disruptor events. On our best days it was hard to maintain these expectations, so of course COVID made things exponentially worse with its resultant transportation volatility. Reducing lead times eliminated the shock-absorbing buffer of time from the supply chain equation, leaving us exposed when COVID-induced supply chain volatility hit.

THE AMAZON EFFECT

The pre-COVID shift toward eCommerce adversely impacted supply chain operations in a number of ways, as consumer expectations radically shifted to what I came to describe as "fulfillment at the speed of thought." At the very same time, markets moved toward more specialized product sets to target the eCommerce channel. And both of these shifts stretched the supply chain even thinner.

My peers who sold to Amazon spoke loud and clear about the impact of Amazon on their supply chain resources. Some of their exact comments:

"Serving Amazon required additional talent and resources from carriers, warehouses, air freight/ small parcel companies, packaging resources, and so on — to serve and react to the e-tailing giant."

"No doubt Amazon has contributed to employment and economic growth, but the consumption of resources and specialized products has stressed a logistics and talent network that was just not ready for the acceleration."

"Amazon led the field in the extreme requirements of vendors. These requirements stretched the supply chain thin of all slack capacity. It spawned copycats — of both its business model and it's vendor measurement approach."

No doubt, due to Amazon's success, nearly every consumer goods company decided they had to be relevant as an eCommerce provider and offered direct-to-consumer options, weighing heavily on warehousing and last-mile delivery services that were already stressed. It is easy to shift all the blame for our industry's pervasive logistical stressors onto a single 'ogre' like Amazon, but many companies with significantly less-optimized resources rushed into DTC models. And as these models came to life, DTC pick, pack, and ship operations began taking up more space in warehouses and using up more shipping capacity, as well as logistical labor resources.

Further, Amazon was also an early adopter of 100% on-time in-full delivery. Manufacturers responded by creating an altered state of reality – creating e-tailer-specific products—fulfilled at the speed of thought, requiring both more warehouse space as well as more geographically diverse warehouses. And onerous compliance fines or fees helped motivate the market to shift towards Amazon's requirements. All factors in the disaster that ensued.

FRUSTRATION-FREE PACKAGING

Many pundits save said that SKU proliferation was one of the reasons for our COVID related supply chain woes. They note, legitimately, that SKU counts have ballooned, but they rarely talk about the specific underlying causes. One of Amazon's most dramatic effects was in the development of eCommerce specific and/or frustration-free packaging standards. In the five years prior to COVID, Amazon pushed the concept of frustration-free packaging — essentially ship ready packaging that was easier and safer to ship. For example, to avoid a bottle of

shampoo opening and spilling all over a box of ten different items. So, if you sold a product that was fluid-based or had multiple components that could conceivably come apart due to jostling while being transported, you had to develop a new package or incur a fine/pay a fee. Amazon began imposing packaging fines for non-compliance to its frustration-free packaging standards.

This was a significant change, and manufacturers had to rethink their product packaging to accommodate the rigors of eCommerce transport, leading to inner seals, taping or bundling or bagging, and almost always more cost. Frustration-free packaging exacerbated SKU proliferation while also increasing labor and packaging costs and significantly reducing capacity utilization. It made manufacturer supply chain operations less efficient across the board. In short, by simplifying warehouse, transportation, and fulfillment operations for eCommerce retailers, we negatively impacted nearly every aspect of the manufacturer's supply chain.

SKU EXPANSION/ DEMAND FRACTIONALIZATION

In a slight variation of the classic take on the SKU proliferation discussion, by trying to be everything to everyone we failed ourselves. Consumer goods companies chased every sliver of revenue opportunity, which led to unfettered SKU proliferation. This proliferation was less innovation-based— driven by new flavors, styles, colors, or scents. In fact, most of my peers spoke of channel-based SKU proliferation. Need a special dollar store SKU? Check. Need a bilingual SKU? Check. Club-pack SKU? Check. eCommerce SKU? Check. Three-pack SKU for Amazon? You guessed it.

No doubt there was some "innovation," but few felt it was groundbreaking. Instead, we expanded our portfolios with SKUs while offering ever-decreasing incrementality by adding another fragrance of body wash, or another mixed-in flavor of our favorite cola product. We became drunk with the appearance of innovation. Not only did this dramatically expand our SKU counts, it also triggered increased variability on base or open stock SKUs, thereby increasing inventory buffers on base SKUs. Here again, warehouse space was impacted as was production capacity as it led to smaller runs and less efficient utilization. We moved away from rationalization or standardization in our packaging and product lines and dove headlong into the proliferation pool without first checking the depth. It was a risk-laden leap.

In the first six months of COVID it was not a surprise when major consumer goods companies announced they were taking steps toward SKU rationalization. In fact it was a long overdue no-brainer, a way to reduce risk and to refocus resources on the most important items in the portfolio.

BOM COMPLEXITY

So far, I have yet to see anyone blame supply chain COVID woes on the rising complexity of bills of materials (BOM), but the matter does offer a keen perspective on the problem of proliferation complexity. Yes, we did add a lot of new items to our product mix before COVID, but we also added complexity to our existing SKUs in ways that might not have seemed significant; we made our BOM more complex and our supply chain risk that much greater. For example, consider a consumer goods company that added a band of metalized film to the label of its popular body wash to be more appealing on shelf. This seemingly simple change added another supplier (metalized film) and doubled the lead time for bottle labels. Even though the company did not add a new ingredient to the BOM — it just changed the label — it led to more complexity in the supplier BOM and a doubling of the lead time.

Manufacturers added complexity to their formulas as well. I would watch (often with amusement) as CPGs added meaningless quantities of aloe (or hemp oil or hyaluronic acid etc.) to products such as body wash so that the ingredients list would read better, or be more in vogue, or appear to be more organic or natural. Many of these add-on ingredients had limited or no clinical value; they were merely "fairy dust" quantities. But because they were part of the validated formula and thus listed on the label, the product could not be produced without them. Imagine the silliness of a body wash that stocked out because it required trace amounts of aloe.

And of course, true to the spirit of human nature, we also found ways over time to make our own problems relating to BOM complexity even worse. To be different, we sourced exotic fragrances instead of using what could be found in North America. We produced bottle caps of all different colors because this made products stand out on the shelf. And we were not happy with simple bottles either — they had to be pearlized. By introducing low value-added complexity into the BOM — either in packaging or in formulation

— we made our supply chains longer and riskier. It is easy to blame the logistical network as reasons for our COVID supply chain troubles, but product and BOM complexity were no doubt a significant contributor.

WE GOT TOO SKINNY WITH LEAN

Somewhere along the way, we declared inventory to be evil and we tried everything we could think of to reduce it. We performed multilevel inventory analyses; we refined our statistical safety stock calculations; we reworked our production cycles and cadences; we improved our forecasts and planning capabilities; and allowed ourselves to become obsessed with leaning inventories. In doing so, we removed all the shock absorbers from our supply chain networks. Some industry pundits offered 'gold star' recognition to companies that reduced inventory, and nearly every supply chain was focused on it.

In best practice, inventory is used as an intelligent buffer in cases when variation is normally distributed. Yet the demand shifts we experienced under COVID were decidedly not normal; they were unlike anything any of us had ever experienced in our lives. And compounding the issue, many safety stock calculations do not even consider supply side variability which is a major flaw. When COVID hit, the cupboards suddenly became empty and we reflexively over-ordered, resulting in a massive bullwhip. I suspect that some reasonable amount of additional inventory throughout the supply chain could have slowed the out-of-stocks and the resultant hoarding and bullwhip effects. There is no way to know for sure. But by miscalculating inventory math we became our own problem and by trying to lean our inventory without considering the risks in doing so, we optimized ourselves into trouble.

WE WENT OEE CRAZY

In short, we became obsessed with efficiency. And while optimizing operational efficiency is not bad, by trying to squeeze more production out of limited capacity (for example), many organizations optimized their production lines around a single product group. This was flawed thinking. Thus, instead of making a variety of rolled paper products on a production line, for example, paper converters had a "toilet paper line," and a "paper towel line," and a "commercial toilet paper line." When COVID hit and demand for their product mix shifted, these manufacturers did not have enough flexibility (or slack capacity or change parts) to make the switch into a different form. During COVID, we discovered that efficiency was the enemy of agility. It is now terribly obvious that we need to rethink how we measure operations.

WE PUT ALL OUR EGGS IN ONE BASKET

One of the factors that made the global supply chain less flexible and agile was sole sourcing too many raw ingredients and packaging materials. So, when our suppliers failed during COVID, so did we. Dual sourcing was just not in our lexicon, which means that sourcing diversity (whether by geography, or size, or capability) was also not discussed. Maybe it was our quest for an extra penny of profit — by putting all our supply requirements in one supplier's basket — or maybe it was just laziness. But it became obvious that we did not expect, plan for, or manage sourcing risk. Of course, the real cost of this single sourcing was revealed during COVID when stock outs became rampant, or additional stock had to be expedited, or when we suffered a barrage of re-qualifications of raw and pack materials. And those suppliers that we didn't use in the past? Well, they made a lot of money when we were desperate.

In writing this article, I had the opportunity to converse with my peers, at length, about their pre-COVID supply chain woes, and there is not a single person that doubted the premise that the supply chain was already fragile. Most of the traditional shock absorbers of demand and supply variability were optimized to a fault. Lead times were pared to the bone. There was no slack capacity. Inventory was lean. The complexity of both SKUs and BOMs was peaking, and external forces such as OTIF measurement and regulatory changes only made matters worse. When COVID hit we lacked agility, or the ability to speed up, or the buffers of time, capacity, or inventory. None of the normal supply chain levers were available when we needed them most. The irony is that we talked about many of these issues at conferences. We knew the risks.

WHAT WE DID NOT DO

In hindsight, we didn't do a lot of what should have been done which I suspect was mostly because no one

expected disruption of both supply and demand. Frankly, we really messed up risk management. When the best talent talked about scenario planning and risk management, the conversations were almost always one-taileds focusing on either a demand or supply disruption, but not both. I attended a lot of risk management presentations, webinars, etc. and I listened carefully to each. I even came back from one conference prepared to host a war room exercise, but it never happened. The effort always seemed a bit excessive and hard to lock down. No one could spare the time. Risk was not top of mind. Maybe we did not have time or had a hundred conflicting priorities - but few did the work.

According to a McKinsey article, only 30% of supply chain managers examined their supplier networks deeper than the first tier. This was a huge miss. If we had looked even somewhat rigorously at our supplier tiers and the shift to offshoring, conservative supply chain planning principles would have suggested we add inventory, production diversity, and flexibility into our networks. Instead, this lack of scenario planning and risk management will likely go down as the biggest operational failure associated with the pre-COVID supply chain. If only we had better managed risk, all the other underlying structural issues would have been easier to identify and manage. We should have calculated risk into our cost formulations. We did not.

Also, it became very clear during these peer-to-peer conversations that our industry did not manage its transportation and distribution network well. We reacted painfully slowly to the rapidly expanding need for more warehouse capacity and did not embrace the need for technical solutions for transportation visibility. We did not spend enough on physical infrastructure (highways and ports) to handle a reasonable surge in traffic and flow of goods brought on by eCommerce and increasing consumerism. The problems seem obvious now that we are completely broken. At one time they were all considered merely a wish list of nice-to-have amenities.

HOW WE MOVE FORWARD

The answer lies in undoing some of the thinking that got us here. We need to view inventory as both useful and strategic and build back buffers of those items that are particularly complex, hard to source, or that have long lead time. We need to simplify our product offerings across channels and consolidate raw materials and components whenever possible. BOM complexity is an especially pressing problem, one that, if chipped away at, has real potential to reduce supply chain risk and shorten lead times.

We need to shorten our supply chains, most likely through intelligent onshoring. We need to deepen our understanding of supply chain tiers — at least three tiers deep — to help us understand where best to focus our attention. And we need to re-source, re-shore, de-risk, and add diversity to our supplier base.

We need to set our lead times based not on some ideal or arbitrary measure of perfection, but pragmatically with the same math we use for safety stock. And we need to expect variability of supply in our safety stock math.

We need to have a counter-balancing metric to OEE that measures operational flexibility and agility, not just efficiency. Investing in cross-product changeover parts would be a smart and simple step toward adding some operational flexibility. And I should note that agility is not just a production or logistics effort, it starts with product design and complexity.

We need retailers to get involved, too. They need to accept pragmatic OTIF metrics. They need to open up the front end of the delivery windows to help manufacturers hit on-time targets without over-extending transportation resources. Retailers need to carry more net inventory to act as a buffer against future disruption. Sharing responsibility for shelf-level in-stock percentages (either real or virtual) would be a difference maker as well. Retailers have pushed too much responsibility for this onto manufacturers upstream.

And finally, a pet peeve: Our technology partners need to stop marketing their applications as "the solution for COVID." There is not any application that could have predicted how this pandemic would play out. Even the most reactive models would have struggled as demand collapsed at the onset of COVID before rocketing up again. Instead, these vendors should focus on interconnectivity and visibility.

Perhaps the greatest challenge is that there is no single rule of thumb that broadly applies to all supply chains because no two are alike and thus there is not a great unified solution. The simplest, most generic 'fix' is to carry more inventory, but that has risk as well. Perhaps the ultimate answer lies within your own experience. There is a need for all of us to turn inward and review every issue or problem raised during COVID and look for the weak points in your own supply chain.

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Learn to Respect 'Good' Inventories: Rethinking Lean Methodology

By Larry Lapide

EXECUTIVE SUMMARY | During the COVID-19 pandemic too many supply chains — predicated on lean inventories — broke down sooner than they should have. Meanwhile, since the pandemic's impacts are now easing, product companies are now stuck with surplus inventories of items that sold well during the pandemic but are no longer. In this column I discuss how the Just-in-Time mindset and overly-focusing on Return of Assets fosters an unfairly negative view of inventories. I argue that this mindset needs to be revisited in light of the lessons taught to us by COVID. I also distinguish between 'good' inventory and 'bad' inventory and the many reasons to hold the former.

LARRY LAPIDE | Dr. Lapide is a lecturer at the University of Massachusetts and an MIT Research Affiliate. He has extensive experience in industry, consulting, business research, and academia as well as a broad range of forecasting, planning, and supply chain experiences. He was an industry forecaster for many years, led supply chain consulting projects for clients across a variety of industries, and has researched supply chain and forecasting software as an analyst. He is the recipient of IBF's inaugural Lifetime Achievement in Business Forecasting and Planning Award. He welcomes comments on his columns at llapide@mit.edu.

(This ongoing column in the Journal is intended to give a brief view on a topic of potential interest to practitioners of business forecasting and planning. Suggestions on topics that you would like to see covered should be sent via email to llapide@mit.edu.)

I recently wrote a column in Supply Chain Management Review (SCMR) titled "Annual e-tailing update: Growth, with a muddled future". It assessed where the omnichannel market is today from a demand-side as well as a supply-side perspective. It also discussed the evolution of Amazon and Walmart. It concluded that the e-tailing market grew more rapidly during the pandemic as more consumers chose the convenience of ordering online when stores closed down. However, brick-and-mortar retailers are starting to win back some market share from e-tailers via innovation. Still, uncertainties abound with respect to what recent trends will continue and how to capitalize on them.

One of the supply-side assessments — of particular interest to forecasting and planning managers — dealt with inventory surpluses now

the pandemic's impact is easing. A Wall Street Journal article titled "Retail Lead Times Spur Inventory Woes" stated that "now that demand is picking up for different items than those routinely sold during the pandemic, retailers are left with increasing inventories in concert with product shortages. Long production cycle times were leading to a pileup of merchandise for many chains. Factory closures, shipping delays, port backlogs and other supply-chain bottlenecks wrought by COVID-19 are prompting chains…to start designing and placing orders with overseas factories further in advance, making it harder to match supply with demand."

WINNERS SUCCEEDED BY HAVING THE GOODS

I understand that making it harder to match supply and demand in the future is problematic for forecasting and planning. However, the article's title implies that having excess inventory is a bad thing. Is it really? It depends!

One of my favorite strategies is to "make hay while the sun shines". This expression appeared hundreds of years ago and was based on the fact that a 'best practice' for farming was to cut hay on a sunny day because you can't do it on a rainy day. Since it was generally difficult to predict whether it would rain the next day, farmers would take advantage of any sunny day during harvest season. What does this have to do with surplus inventory?

Well, if a company used the pandemic's uncertainties as an opportunity to gain market share against weaker competitors, then having excess inventory leftover would have been beneficial – the implication being that they wouldn't have missed out on any lost sales. For example, if inventory surpluses are comprised of mostly high-margin items, then it indicates that the company did not incur any lost sales of high-margin items. Also, the high-margin surplus items can be easily marked down to shift the stock while maintaining profitability. However, if a company is left with a lot of low-margin surpluses while experiencing shortages of high-margin items during the pandemic, then that is likely a bad thing. In such a scenario they have missed out on sales of high-margins products and had to sell low-margin products at a discount, possibly ultimately sold at a loss.

In short, being left with high-margin excess inventory after gaining an advantage in long-term market share is a positive outcome. This is the lesson we learned from the Newsboy problem that I described in the Spring 2019 issue of this Journal; missed sales of high-margin items represent a higher dollar value than the costs of excess inventories. The opposite is true of low-margin items where excess inventories can easily outweigh the dollar value of missed sales.

A Spring 2022 article in this Journal discussed that early in the pandemic, Toyota's purchasing managers made 'speculative buys' of semi-conductor chips that apparently paid off by allowing the gaining of market share, at least in the short run. A January 2022 *Wall Street Journal* article titled "Toyota Passes GM in Sales, In a U. S. First" stated, "GM has been the No. 1 auto seller in the U. S. since 1931, [Toyota] has largely benefited from its decision to stockpile computer chips". Shortages of semi-conductors used can delay the sale of the many cars – the cost of missed sales opportunities far exceeds the costs of excess semi-conductor inventories.

CHANGE YOUR INVENTORY MINDSET

In 2010 I wrote a column in SCMR titled" Change Your Inventory Mindset" which discussed 'good' versus 'bad' inventory. At that time, I was advising that cost- and inventory-efficient supply chains would need to change to energy-efficient ones as the price of oil continued a gradual climb upward. Energy-efficiency would require becoming less fixated on reducing inventories via leveraging faster (and energy-inefficient) freight modes, and instead becoming more reliant on slower, more efficient modes such as ocean rather than air, barge rather than rail, and rail rather than truck for in-bound and inter-facility shipments. This move to energy-efficient chains could lead to an increase in in-transit inventories and other inventories that result from using slower transport modes. Additionally, more goods would need to be stocked closer to consumers. Both factors can increase inventories if managers did not deploy only 'good' inventories along energy-efficient supply chains. Of course, few followed my advice because holding too much inventory was considered a waste and was discouraged by executives focused on maximizing Return-on-Assets (ROA) and Just-in-Time (JIT) replenishment.

Prior to the COVID-19 pandemic, global supply chains had evolved

toward being optimized, largely cost-effective, and efficient rather than responsive. As the virus ravaged the globe, demand was adversely (and unpredictably) impacted, and supply chains broke down for lack of labor and material shortages. Managing global supply chains became chaotic. In short, the JIT violin strings of supply chains were wound too tight, and eventually broke down under the stresses put on them by the virus! Had companies held more inventory of goods prior to the pandemic, supply chains would have still broken down, but significantly later.

The remainder of this column is dedicated to arguing (once again) that managers and executives need to rethink their view of inventories. Inventory in and of itself serves a purpose, and is often a good thing.

WHAT ARE GOOD INVENTORIES?

I have to confess that I love inventories. That is, 'good' inventories which are deployed for good reasons such as mitigating uncertainties or are based on sound economic principles. Of course, I don't like 'bad' inventories that don't serve a purpose, those that inevitably wind up being drastically marked down in price or disposed of.

Many supply chain managers would think me wrong. They and financial managers don't often appreciate inventory. Generally, the latter managers generally don't appreciate inventory assets, since they don't understand the benefit of using 'valuable' financial capital to acquire and just hold them. 'Lean' advocates are charged with cutting waste to the bone and in their zeal for getting leaner, often eliminate 'good' inventories with the 'bad'. They risk a problem in customer service because their supply chains go from lean to emaciated.

However, like cholesterol, you want to keep your total inventories as low as possible without the 'good' component getting too low. Inventories are buffers in a supply chain. All complex systems need buffers to maintain their stability and survival. Your car, for example, has shock absorbers and springs to cushion bumps in the road. Constant rattling of a car without them would render nuts and bolts loosened and the car would eventually fall apart. Also, inventories serve to decouple successive operations in a supply chain.

'Bad' inventories are those deployed 'just-in-case' as well as the ones deployed using gut instincts rather than sound analysis. These 'bad' inventories are only useful when managing supply chains that are subject to uncertainties (vis a vis risk), because they are useful when deploying optimistic 'risk-loving' strategies when facing uncertain futures. In contrast, 'good' inventories are surgically employed with a purpose, and are based on economic principles. Examples of 'good' inventories are described below:

- The best inventories are customer-facing. These are held near enough to the consumer to meet random demand. In reality some types of inventories need to be deployed in advance of a customer order so that fulfillment can be flawlessly executed; whether they are held in raw materials, works-in-process, or finished-goods, as well as by a company or its suppliers.
- Replenishment or cycle stocks are 'good' when they are based on optimizing order quantities and production lot sizes. The optimizations normally involve tradeoffs, such as balancing inventory holding costs versus setup/ordering costs.
- Buffer inventories are generally 'good' because they decouple operations. Per the Theory of Constraints, inventory should be held before a bottlenecked operation to ensure that its throughput is maximized. Similarly, it needs to be held following an unreliable operation to ensure its disruptions do not impact downstream operations.
- Safety stocks are 'good' inventories because they are needed to cover vagaries in customer demand and unreliable supply. They decouple supply and demand operations to ensure reliable supply. If they are set based on achieving levels of customer service, they are largely 'good'. However, if based upon an arbitrary rule-of-thumb such as weeks-of-supply, they will likely include 'bad' inventory for some items and not enough 'good' inventory for others.
- Pre-build inventory is mustered in anticipation of high seasonal demand to work around manufacturing limitations and to smooth production. This inventory is mostly 'good' because it allows production capacity to be less than what peak demand dictates, thus saving expensive capital expenditures. A certain amount of 'bad' inventory can be generated if pre-building is done too soon or in greater quantities than needed. Analysis is needed to minimize 'bad' pre-build inventories.

The above constitute a list of most 'good' inventories. After the pandemic, a real inventory challenge for a supply chain manager will be to shift a company's mindset regarding the val-

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Trial & Repeat: A Consensus Approach to New Product Forecasting

By Rich Gordon

EXECUTIVE SUMMARY | The most difficult thing in forecasting is to forecast new products because they have no direct history to go by. In this article, I describe an approach to focus consensus team forecasting, called 'trial and repeat.' It is used to forecast demand and success indicators for new products. The article explains step-by-step how it works to forecast and how it is used to measure and adjust expectations during the first year of sales. I also describe how I got how he got the approval of senior management as well as of others involved in embedding this model in the process.

RICH GORDON | Rich Gordon is the Advanced Analytics Manager at Standard Process, a 92-year-old food supplements company. He has been working in forecasting and analytics since 1992, having worked in forecasting and S&OP roles at Kraft, L'Oréal, and Duracell. He spent a decade on IRI's Analytical Team for ConAgra. He holds an MBA in Quantitative Analysis from Saint John's University and a BS in Marketing from SUNY Old Westbury.

I work for Standard Process, a 90+ year old family-owned whole food nutritional supplement company. The products it manufactures are primarily prescribed and sold through Health Care Practitioners (HCPs). Products combine the healing power of nature with scientifically supported evidence. They are safe, effective, nutritional supplements offered through healthcare practitioners who sell them to their patients. The company is vertically integrated from our organic farm to the bottled supplements.

FOUR STAGE GATE PROCESS

New products are an important source of innovation and revenue. They are highly risky yet necessary for

survival and growth. We use a four-gate approval process to conceive, develop, and launch a product. Each gate is reviewed and approved by our C-suite executive committee. In Gate-1 we size the potential opportunity, discuss analogs (similar products), determine R&D requirements, and market research needs to refine the prospective product. In Gate-2 we evaluate research gathered, and further refine the proposal including product development, costing, market research needs, and pricing. While it can happen in Gate-1, it's most often in Gate-2 where we start applying the Trial & Repeat approach. Gate-3 is where we finalize product, financial forecasts, and marketing plans. When the Gate-3 proposal is approved by the Executive Team, we start manufacturing the product. During the first year, our analytics team reports new product status monthly in our Sales & Operations Exceptions meetings (S&OE), which guides our short-term manufacturing, marketing, and sales efforts. Gate-4 involves a four-to-six-month review and learning from the launch.

NEW PRODUCT FORECASTING MODEL: TRIAL & REPEAT

Our approach to new product forecasting is to use internal expert opinion applied within a model's constraints. Trial & Repeat separates the forecast into measurable components of distribution penetration (trial) and repeat purchases. This methodology originated in consumer-packaged-goods using household panel data. We are applying a similar concept to Health Care Practitioner (HCPs) purchases. We use shipments to HCPs because patient level data is not available. When the product starts selling, we track progress based on those assumptions which yields a more robust understanding of the marketplace.

Our forecasting teams include participants from Project Management, R&D, HCP Education, Analytics, Marketing, and Finance. Patience is important for success when leading a consensus team through the modeling steps. It was difficult for me to influence folks who focus on getting to a bottom-line objective vs building assumptions and seeing the result. The logic becomes apparent by the end of the process. Focusing consensus on assumptions, the Trial & Repeat model has been a good guide during consensus meetings.

STEP-BY STEP APPROACH TO MODELING

Figure 1 below shows a recent forecast used to drive team discussion. Bold cells in columns A and B represent decision points. The two tables in columns E through K are our New Product and Ongoing Analogs.

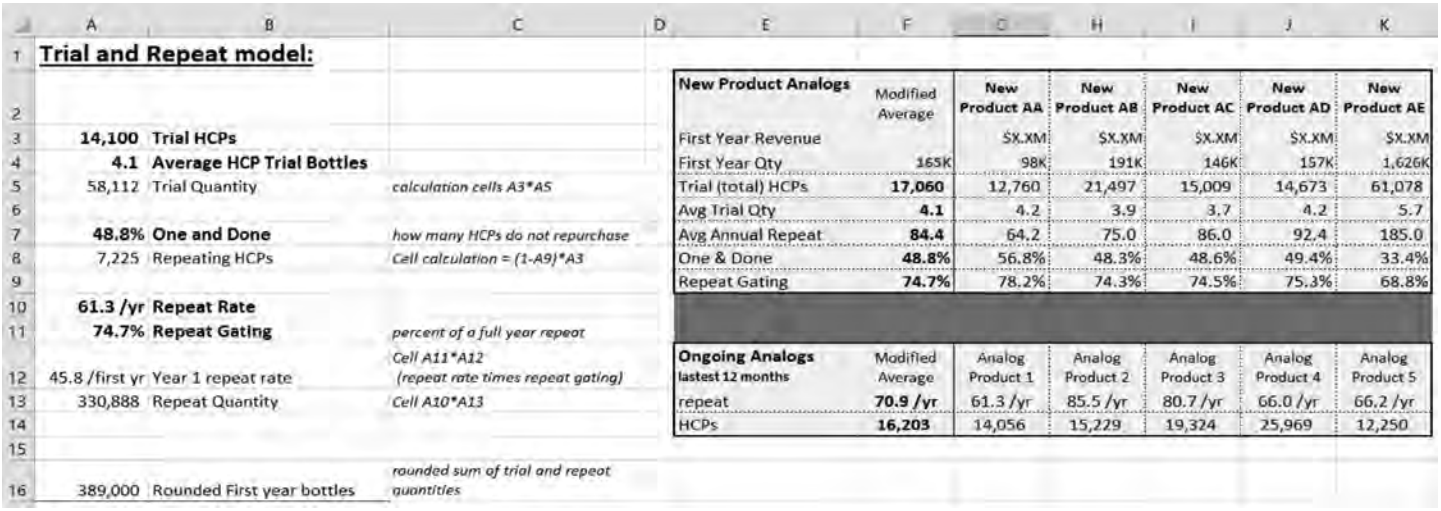
Step 1: During our Gate-1 meetings, the team decides which products to use as analogs similar to the new product. There are two kinds of analogs we use to guide discussions: new products targeted to the same HCPs with their first-year sales statistics (cells E2 to K9 in Table1), and similar ongoing products (cells E12 to K14). During Gate-2 meetings the analytics team provides pertinent analysis about the analogs.

Step 2: Decide on the distribution penetration (trial), that is, how many HCPs are likely to buy it based on the experience we have with our analogs. Consensus team members look at penetration generated by the analogs and then collectively decide on the number of HCPs that are likely to place the order as well as how many bottles, on average, each one will buy. In so doing, the team review looks at the price, product benefits, dosage required, cannibalization and competitive factors. Key to this is reviewing how other new products attained their first-year distribution and how much distribution ongoing analog products have. As shown in figure 1, the team believes 14,100 HCPs will be distributed (cell A3), and the average number of trial bottles per HCP will be 4.1 (cell A4). With that, the total quantity of trial bottles comes to (cell A5) 58,112 (14,100 × 4.1).

Step 3: The next step is to decide about the repeat business, starting with how many customers (HCPs) will repurchase. When new products are introduced, many HCPs fill up their shelves, try it, then decide it is not for them. We call these customers One & Done (cell A7). The team reviews how other products did during their first year (cells E8 to K8). The team decides to go with a modified average of 48.8%. This means 51.2% (1-48.8%) will provide repeat business. The number of HCPs that will provide repeat business will be 7,225 (cell A8) (14,100 × 51.2%).

Step 4: Next, we look at how many bottles the average HCP will purchase over 12 months. From ongoing related analogs, we review the 12-month bottle repeat rate (cells E13 to K13). We also review annualized repeats on the prior new products (cells E8 to K8). Our decision of 61.3 (cell A10) was based on the same recommended dosage of similar on-going product 1 (cell G13).

Figure 1 | **Calculations of Trial & Repeat model**



	A	B	C
1	**Trial and Repeat model:**		
2			
3	**14,100**	**Trial HCPs**	
4	**4.1**	**Average HCP Trial Bottles**	
5	58,112	Trial Quantity	*calculation cells A3*A5*
6			
7	**48.8%**	**One and Done**	*how many HCPs do not repurchase*
8	7,225	Repeating HCPs	*Cell calculation = (1-A9)*A3*
9			
10	**61.3 /yr**	**Repeat Rate**	
11	**74.7%**	**Repeat Gating**	*percent of a full year repeat*
12	45.8 /first yr	Year 1 repeat rate	*Cell A11*A12 (repeat rate times repeat gating)*
13	330,888	Repeat Quantity	*Cell A10*A13*
14			
15			
16	389,000	Rounded First year bottles	*rounded sum of trial and repeat quantities*

New Product Analogs	Modified Average	New Product AA	New Product AB	New Product AC	New Product AD	New Product AE
First Year Revenue		$X.XM	$X.XM	$X.XM	$X.XM	$X.XM
First Year Qty	165K	98K	191K	146K	157K	1,626K
Trial (total) HCPs	**17,060**	12,760	21,497	15,009	14,673	61,078
Avg Trial Qty	**4.1**	4.2	3.9	3.7	4.2	5.7
Avg Annual Repeat	**84.4**	64.2	75.0	86.0	92.4	185.0
One & Done	**48.8%**	56.8%	48.3%	48.6%	49.4%	33.4%
Repeat Gating	**74.7%**	78.2%	74.3%	74.5%	75.3%	68.8%

Ongoing Analogs lastest 12 months	Modified Average	Analog Product 1	Analog Product 2	Analog Product 3	Analog Product 4	Analog Product 5
repeat	**70.9 /yr**	61.3 /yr	85.5 /yr	80.7 /yr	66.0 /yr	66.2 /yr
HCPs	**16,203**	14,056	15,229	19,324	25,969	12,250

Not all customers start purchasing a product the first month it's available, so we use a repeat gating factor for how many repeat bottles will be purchased in year 1. We used the modified average of historical new products (cells E9 to K9) to drive the decision of 74.7% (cell A11). The resulting calculation is that each HCP will re-order 45.8 bottles in the next 12 months (61.3 × 74.7%) (cell A12). Since the number of HCPs that will re-order is 7,225 (cell A8), the total number of repeat bottles will be 330,888 (7,225 × 45.8) (cell A13).

Therefore, our forecast for total bottles in year 1 equals trial bottles plus repeat bottles 389,000 (330,888 + 58,112) (cell 16).

TRACKING FORECAST ACCURACY

New product forecasting provides guidance for manufacturing, planning and marketing adjustments when the product starts selling. Over-forecasting means wasting out-of-date products. Under-forecasting results in missed opportunities and backorders. It also kills new product momentum, discourages our sales team, and causes our customers to question our reliability. With the Trial & Repeat model, we have substantially improved our forecast MAPE from 86% to 41%. For New to the World products, we brought down MAPE from 77% to 51%. Forecasts previously prepared were heavily biased by senior management objectives. With this new approach, we reduced biases, making decisions collectively. The decision is built collectively based on Trial & Repeat assumptions.

TRACKING FORECASTING SUCCESS

Once the product is launched, we track the success of the forecast. Success is thought of in several ways. Financial success is in delivering what we projected and communicated to the executive committee. Supply chain success depends on whether it has been out-of-stock or having excessive inventory. Sales success depends on penetration and follow-up (thereby influencing repeat orders) while Marketing is judged on meeting both trial and repeat numbers. As we report the forecast status, each of the teams adjust their plans based on what is happening. Our key to success is in having coordinated action plans.

POST-LAUNCH REPORTING & ADJUSTMENTS

During the first eight weeks after a product is launched, we provide weekly penetration and repeat status to key stakeholders. For the first year, the analytics team presents product status at the monthly Sales & Operations Exceptions meeting. The meeting provides a forum where we can discuss the opportunities and challenges of each new product. We take a top-down approach during the review process, then drill deeper.

Figure 2 gives a financial picture of one product, Z. The dotted black line with diamonds gives monthly revenue; the black, thick straight line gives

Figure 2 | Financial forecasts status of new product Z over 12 month period

average monthly revenue ($469K); and the grey straight line gives the average monthly goal ($395K). As it stands now, we are doing better than our goal by 18.7%. Since our internal partners prefer average monthly forecasts over forecasts by month, we present forecasts in average monthly buckets.

To get a better picture of where the revenue is coming from, we break down the revenue into trials and repeats as shown in Figure 3. Here, lined gray stacked columns show revenue trial purchases, while the solid black stack columns display revenue from repeat purchases. The first month is always 100% trial because there is no repeat order. Typically, in the first few months of a launch, we get the most revenue from trials due to our marketing and sales efforts. Thereafter, the portion of repeat revenue increases. If repeat

Figure 3 | New product Z: HCP trial and repeat revenue

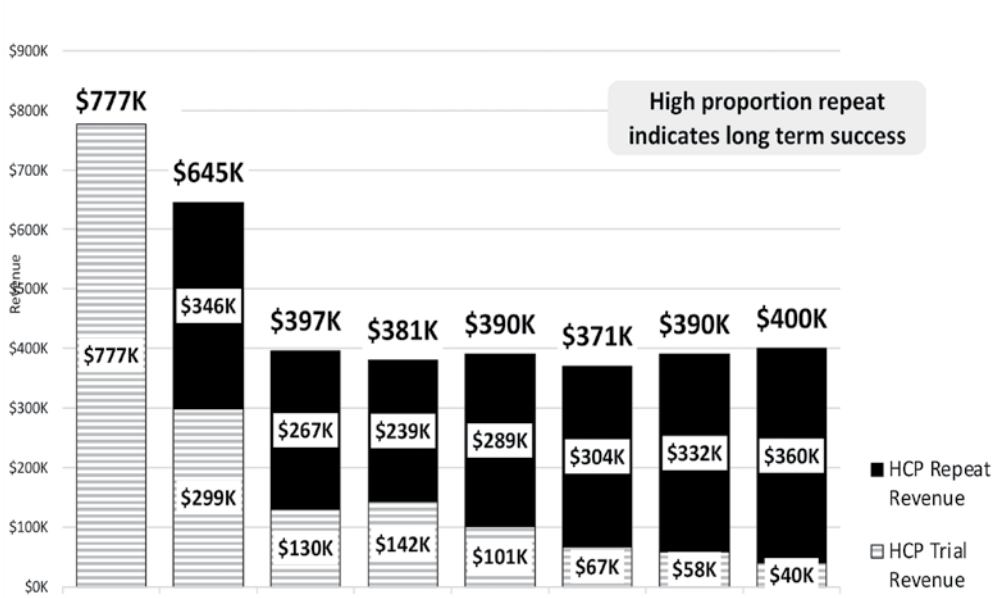
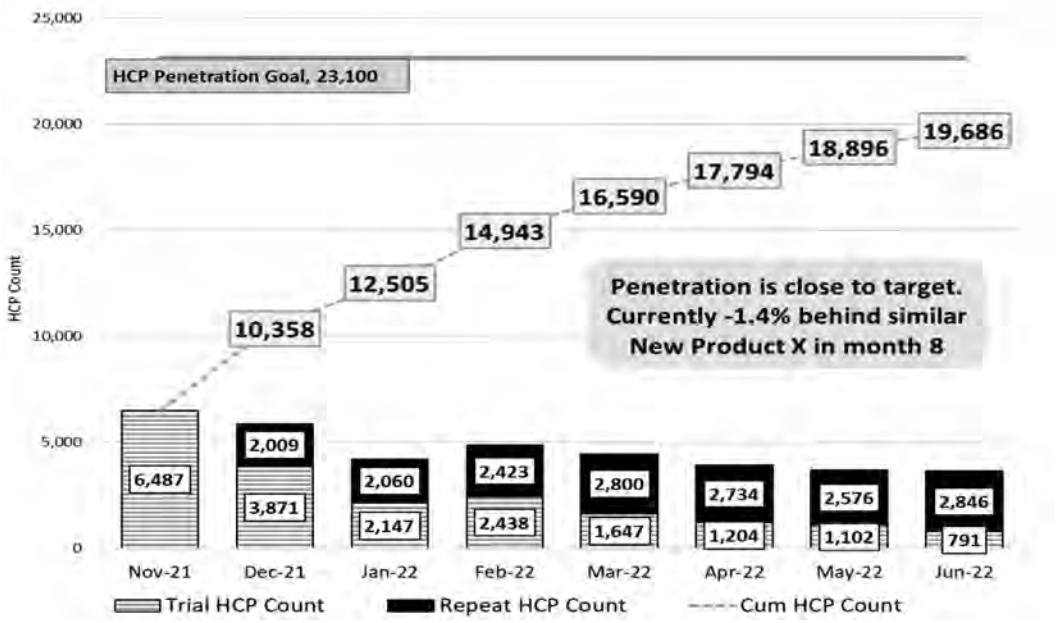


Figure 4 | New product Z HCP trials forecast, 12 months ahead



revenue significantly exceeds trial revenue, our qualitative team can find success stories to help market the product into more HCPs. This is the case with New Product Z.

Next, we review trial vs. goal (forecast). In Figure 4, the gray straight line shows our total customer trial goal (forecast), which is 23,100. It is a key success metric for the sales team. The dashed gray line shows cumulative HCP count month by month. The lined grey stacked column shows trial customer count for each month. The solid black stacked column displays the count of repeating HCPs for each month. Our sales staff get individualized reports with specifics about their territory trial success and opportunities, as well as reports on repeat activity to help them plan follow-up visits.

The table in Figure 5 summarizes the results, which compares the plan to what was achieved. I use this chart to summarize where we are on the key drivers. It shows so far that we have achieved average monthly revenue of 118.7% of the plan. As for Trial HCPs, we have achieved 85% of it. Repeat HCPs are coming along well, only 8.8 points behind the plan at month 8 with 4 more months to go. As for repeat bottles per month, the product has 31% greater average repeat.

To conclude, the Trial & Repeat model is not only highly practical but it also significantly improves forecast error. But it took a while for the senior management to recognize its value and make it a part of the demand planning process. To get their acceptance, I used to present the status of Trial & Repeat forecasts in the monthly S&OE meeting and make suggestions about what needed to be done to Óachieve our goals. As our forecasts improved, we gained their acceptance. With that, our internal partners also opted to embed it in the process.

—Send comments to JBF@ibf.org

Figure 5 | Plan vs. achievement

	Year 1 Plan	Current	Achieved
Average Monthly Revenue	$395 K	$469 K	118.7%
Trial HCPs	23,100	$19,685	85%
% Repeat HCPs	50.8%	42.0%	-8.8 pts
Repeat Bottles / Mo / HCP	5.1	6.7	131%

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The Rise of S&OE: Achieving Organizational Objectives with Improved Execution

By Steven Hainey CPF

EXECUTIVE SUMMARY | The unprecedented supply constraints and demand shifts that emerged during COVID and are being exacerbated by the war in Ukraine and rising inflation, have highlighted the criticality of short-term, tactical planning. In this article I discuss how Sales & Operations Execution (S&OE), when integrated into Sales & Operations Planning (S&OP), can effectively identify and address gaps in the S&OP/IBP plans and AOP. Far from being yet another business planning acronym, this process is a valuable addition to existing S&OP/IBP processes and helps mitigate the risks and volatility we are currently experiencing, facilitates adherence to enterprise goals, and enable companies to fully leverage their competitive advantages.

STEVEN HAINEY | A planning veteran, Steven has implemented integrated planning processes and advanced existing ones at a range of Fortune 500 Companies, Private Equity held corporations and multi-billion-dollar family-run organizations for over two decades. As Senior Operating Director at Beckway Group, Steve optimizes S&OP/IBP, S&OE, ERP Planning Configurations, and other supply chain and operations processes for companies in its portfolio to drive strategic initiatives and EBITDA growth. Steve's previous roles include Global Supply Chain Leader at Honeywell, Director of Supply Chain at Newell Brands, and VP of Integrated Business Planning at Ashley Furniture. Steve is an IBF Certified Professional Forecaster (CPF) and holds a degree in Business Management from Shippensburg University of Pennsylvania.

You can't turn on the TV, open your internet browser or read a business periodical without seeing something new about corporations missing their objectives due to supply chain disruptions and demand swings. The pandemic, inflation, and the war in Ukraine placed exponential variabilities on

Figure 1 | The differences between S&OP/IBP and S&OE

S&OP/IBP: 3-18 months planning horizon	S&OE: Short-term tactical actions
Demand Review: • Optimize forecast accuracy • Support AOP monthly evaluation • Plan new product requirements • SKU rationalization and reductions • Demand shaping programs	**Demand:** • Align short-term actuals with S&OP/IBP and AOP plans • Customer order entry with reasonable Available To Promise (ATP) Dates • Address customer order backlogs
Supply Review: • Confirm production capabilities for the mid to long-term • Verify suppliers' abilities to meet timelines • Supply risk assessments	**Supply Review:** • Assess production and supplier capabilities vs actual demand • Monitor weekly production adherence and supplier performance • Track warehouse shipment throughput & logistics lead-times
Reconciliation Review: • Demand & Supply Plan Assessment versus AOP objectives • Review short-term demand and supply trends versus plan assumptions • Scenario analysis to align on growth opportunities and identify AOP and financial objective gaps	**Reconciliation Review:** • Weekly trend analysis to identify operational & plan gaps vs monthly AOP objectives • Close short-term gaps through overtime, expediting, demand shaping, outsourcing etc. • Review pricing for adjustment opportunities • System data updates for changes in lead-times, safety stocks, MOQs, BoMs etc.

Source: Beckway Group

existing business processes that continue to get more and more complex with each passing year.

Many of these struggles are encountered when there is no formal integration between mid- to long-term corporate planning and boots-on the-ground, tactical execution activities. Given the different integrated planning processes already utilized by companies, do we need another business process (and yet another acronym)? Like all complex and nuanced questions, the answer is "it depends". If the organization currently has mid- to long-term strategic plans aligned, integrated, and achieving their company objectives, the answer is a straightforward "no". For businesses struggling to achieve their goals during the last two years given the challenges described above, however, an additional formal practice to align their approaches to tackle these headwinds would be an enormous help.

The industry term for such a process is Sales & Operations Execution (S&OE). Over the last few years, S&OE has been increasingly written and talked about in the planning community as it successfully addresses the pain points most companies have been facing. At the same time, many business practitioners think this is another unnecessary, consultant-derived acronym designed to sell consulting services. As a practitioner working in the trenches of planning for almost three decades, I ask such sceptics to reflect on the current global factors weighing heavily on the operational efficiency of companies such as Apple, Microsoft, Amazon, Tesla, and others. The problems these companies are experiencing are well documented and no doubt all too familiar for anyone in a supply chain or planning role.

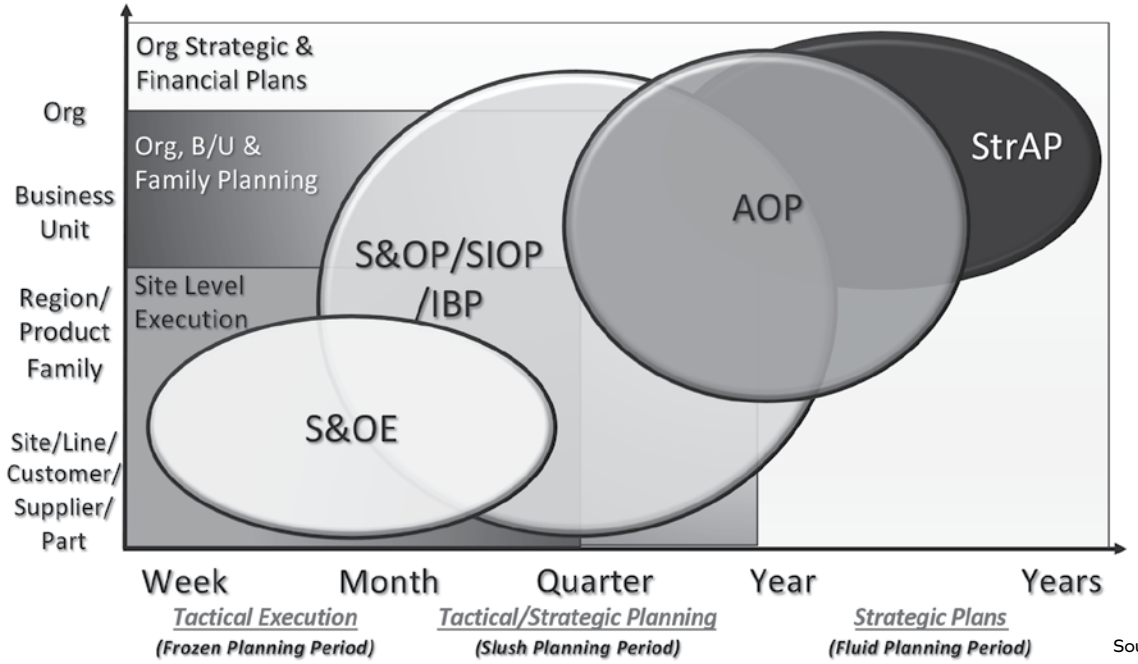
WHAT ARE THE DIFFERENCES BETWEEN S&OP/IBP & S&OE?

The simple difference between them is that S&OP/IBP is the high-level, 3 to 18 months 'planning stage' for an enterprise, business unit, or product family. In contrast, S&OE is the 'transactional stage' running anywhere from a week to a few months (see Figure 1).

S&OE is where sales orders are entered, product jobs are released, POs are created, and intercompany transfer orders are issued, among other things. For ERP specialists familiar with MPS/MRP planning horizon terminology, the S&OP/IBP planning covers the long-range Fluid stage back into the Slush period, and then S&OE is the Slush order creation period, moving into the Frozen segment (see Figure 2).

The goal of the S&OE processes is to assist in achieving organizational objectives and financial commitments. This is done by identifying variances as they begin to emerge and addressing them within the weekly short-term cycles, instead of waiting for the monthly planning meetings. These S&OE processes and their supporting performance measurements aim to deliver on the S&OP/IBP plan

Figure 2 | How S&OE fits alongside S&OP/IBP, AOP, and Strategic Planning



Source: Beckway Group

by identifying short-term gaps and deciding on methods to address them. Gaps can include plan disruptions due to supplier shipping delays, customer demand spikes and troughs, production throughput shortages, system planning parameter errors, logistics barriers, and warehouse storage constraints, to mention just some of the more common ones that have arisen recently amid the pandemic.

Many companies have weekly — or even daily — tactical department meetings. Still, these are usually not cross-functional nor are they formally communicated to strategic planning, thereby failing to manage unplanned disruptions. This lack of alignment tends to cause the mid- to long-term strategy (S&OP/IBP) meetings to spend significant time focusing on short-term, tactical firefighting instead of the mid- to long-term planning requirements needed to get out of these types of situations. I like to sum this up by telling colleagues: "It's a challenge to plan your way out of tactical problems and harder to execute out of the planning ones." This is because without the appropriate mid to long-term forecasts, capacity supply plans, and other strategic business planning elements in place, it's difficult to have the required downstream inventory to support the organizational objectives. Due to this, both elements are required to have a competitive advantage within today's dynamic environment.

HOW DOES S&OE INTEGRATE WITH S&OP/IBP?

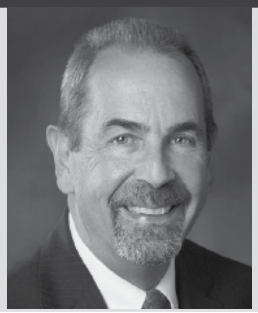
Let's walk through an example and see how S&OE integrated within a mature S&OP/IBP process will drive enhanced responsiveness and value for an organization. Imagine you're in a leadership role of a craft beer manufacturer in the current environment. In 2022, you're facing cost increases and shortages of critical raw materials of CO2, glass bottles, and aluminum. With a mature S&OE process in place, you will pick up supplier price increases and delivery delays upon the purchase order confirmation entries within the ERP system. Analytical reports from this confirmation data will quickly inform the different cross-functional teams of the risks to the S&OP/IBP and financial plans, and which ERP parameters need to be updated for major variances before the purchase orders are even received at your facility. Reports from the planning tool will quickly inform the different cross-functional teams of the risks to the S&OP/IBP and financial plans, and which ERP parameters need updating. Proactive use of Pareto-based analysis tools allows you to prioritize items that need to be addressed first; if supplier costs increases, the S&OE can assess what price increase the market will stand, and in the case of longer

continued on page 39

20 Questions

WITH A PLANNING LEADER

Allen Jacques
Industry Thought Leader



Interview by Andrew Scuoler CPF

How did you get into demand planning and supply chain?
When I was with Baxter I relocated from Yugoslavia to Belgium and was given responsibility for the surgical gloves supply chain which included some 80 SKUs. I inherited a system whereby sales forecasts would be provided each month from the 20 affiliates who sold the gloves. Instead, I decided to run statistical forecasting models on total European demand. The resulting fore ast accuracy was outstanding, and I used the forecasts for production planning in our Malaysia facility and also calculated reorder points for each affiliate/SKU combination and used them for distribution planning. I fell in love with supply chain and never turned back.

What are the unique challenges and priorities when planning demand in the pharmaceuticals industry?
Launching a new pharmaceutical is the most challenging part of planning its demand. Because of long lead times, this process starts over a year before expected approvals by the FDA, EMA, MHRA, and other regulatory agencies. There is obviously no sales history, so you need to work closely with marketing, the market access team, and your manufacturing sites. The first 12 months after launch you are closely monitoring actuals and adjusting your manufacturing plans. Only a year after launch does statistical modeling start to play a role.

How has the pharmaceutical industry been impacted by recent supply and demand shocks?
In general, the pharmaceutical industry fared well compared to other industries. Lost capacity due to COVID outbreaks was rare so after the initial demand spikes due to hoarding, things stabilized. The vaccines did consume unprecedented vial filling capacity which caused shortages of products previously using that capacity. The medical device industry was significantly impacted when demand fell through the floor due to postponements of procedures in hospitals. There was then a surge in demand when things normalized to make up for those delayed procedures.

How robust is the pharmaceutical supply chain in light of recent disruptions?
The biggest concerns for the industry are the trade war with China, which could impact raw materials and active pharmaceutical ingredient supply, and recovery of vial filling capacity, which is well on its way. The industry as a whole has proven to be quite robust over the last two years but is not totally protected from disruptions such as the baby formula issue in the U. S. which is due to a manufacturing site not meeting FDA requirements. Due to the complexity of pharmaceutical supply chains and the diverse network of suppliers and manufacturers, the effects of the pandemic may not be fully understood for another year or so. That's when we will truly understand how robust we are.

Did COVID reveal that we've gone too far with the Lean methodology?

We are certainly seeing companies moving from "Just In Time" to "Just In Case" but there is a limit on how far they can go because of product shelf-lives and expiration concerns. Also, base patient demand for pharmaceuticals was not overly impacted by the pandemic — after some initial spikes it returned to normal. The real lesson learned over the last two years is the importance of end-to-end visibility (including suppliers and contract manufacturing), immediate transparency into the impact of events, and rapid decision making in response.

Is the pharmaceutical industry embracing dual sourcing or nearshoring to mitigate supply chain risk?

Dual sourcing in the pharmaceutical industry has been a hot topic for decades, even to the point of having redundant manufacturing capacity. The last two years have certainly increased the focus on it but it has always been a key risk mitigation strategy. It really boils down to the cost of dual sourcing and how much of an appetite a company has to pay that price.

I am sure that companies are looking at nearshoring but do not believe that it will become a major trend. Manufacturing sites are very expensive and take 3 to 5 years to construct, validate, and get regulatory approvals for. Also, tax strategies are the primary drivers for manufacturing networks which work against nearshoring.

During COVID, rival pharmaceutical companies engaged in 'joint manufacturing'. What does that involve?

This was around the unprecedented vial filling capacity that was needed for COVID vaccines and a recognition in the industry that it needed to collaborate to fill those gaps. It involved 1) global assessments of available capacity, 2) a high level of technical collaboration and knowledge transfer, 3) tech transfer projects, and 4) rapid assessments and approval of new manufacturing sites by regulatory bodies like the FDA and MHRA.

EY recently proposed they extend that to 'joint production'. Does that idea have legs?

The cynic in me does not believe so. They will certainly collaborate around global issues like pandemics and severe drug shortages but will be reluctant otherwise. There has been talk for decades about co-construction of capital-intensive facilities to mitigate the risk of non-approvals but I have rarely seen that acted upon. Having said that, contract manufacturing has exploded and is filling that role. All pharmaceutical companies, big and small, have outsourced some or all of their manufacturing operations and this could be seen as a form of "joint production".

Is domestic end-to-end production of pharmaceuticals possible?

It is absolutely possible but would never be feasible to roll out for more than one or two regions due to capital cost. Typically, a pharmaceutical supply chain will have a primary site for the active ingredient with a back-up option, then multiple sites for making the bulk tablets/capsules/vials/syringes, plus regional sites for the final packaging. It is what I call a 'one-to-few-to-several' relationship. There would have to be a critical mass of demand to justify a domestic end-to-end supply chain whether that it's in the U. S., Europe, or China, but even then I do not see this as a future trend.

Will reshoring of manufacturing change the role of Demand Planners/Supply Chain Managers?

Absolutely not. It will impact lead times, suppliers, costs, etc. but not the fundamental roles of demand and supply planning. It would actually increase the workload during those transitions. Demand and supply planning will always be mission critical roles for pharmaceutical supply chains.

What are the nuances of inventory management for the pharmaceutical industry?

As in any other industry, the CFO will always be focused on cash flow and inventory is a key component. That being said, there is a need to balance buffer inventories and safety stocks with shelf-lives at every step of manufacturing, from raw materials to intermediates to finished goods. Most distributors have a minimum remaining shelf-life requirement of 12 months for finished goods otherwise they will not take the product. Higher inventories put more products at risk of expiring, especially in the case of over forecasting.

Many products are what we call "cold chain", (cannot be stored at room temperature) and have rigorous temperature monitoring requirements throughout the supply chain. On a separate note, gross margins for pharmaceuticals are very high so most companies will take inventory risk to ensure that not one euro or dollar of sales is lost. Even the CFO will take that position but he/she will still push you for reductions. That's called talking out of both sides of your mouth!

Are collaborative planning processes like S&OP and IBP adequately solving the complexity of global manufacturers like Pfizer?

Absolutely. When I started in the supply chain we were starving for data, now we are drowning in it. Fortunately, we have the solutions to leverage this data by 1) providing end of end visibility across the enterprise, 2) extending this visibility to suppliers, contract manufacturers, and distributors, and 3) turning this visibility into transparency so that all stakeholders immediately understand the impact of a change in demand or a manufacturing issue.

All parties along the supply chain can plan concurrently and collaborate seamlessly. Imagine raising your forecast for a product by 10% or

bidding on a tender and immediately seeing if the manufacturing network can support it and, if not, collaborating with the supply planners to come up with a solution in a matter of hours, sometimes minutes.

What does it take to reach VP level roles at multinational companies?

The first thing that it takes is to be very good and thorough at what you do. When you excel in your role you will make a difference and you will get noticed. Get involved in projects that expose you to other areas of supply chain and the enterprise. These will lead to opportunities to sit in meetings including VP levels and even President. When you do get an opportunity to present or have a one-on-one discussion, refrain from sharing opinions and be grounded in fact-based analysis.

Also read your audience well. Some VPs will want you to get to the point quickly and not drown them with PowerPoint while others will ask for detail. Start off with 5 - 6 slides that get to the point and have the detail in back-up for those who want to know more. This will get you invited back to the table.

How can planning and supply chain leaders mitigate the impact of inflation?

Being able to assess the impact on cost quickly e.g., an increase in the price of raw materials or components used in manufacturing. Then run what-if scenarios to see if there are alternatives that could mitigate that impact like an alternate supplier or shipping route. If all else fails, help the enterprise understand if inflation has made some products unprofitable and ask the tough questions such as SKU rationalization. Of course, a primary role of supply chain planning will always be to optimize manufacturing operations and distribution flows. Controlling and smoothing flows has a profound impact on cost and inventory.

What does Demand Planning 2.0 mean to you?

Enhancing statistical methods with newer algorithms such as Random Forest, adding machine learning capabilities that go well beyond historical demand analytics, and leveraging big data for demand sensing. Knowing that a competitor has compliance issues at a manufacturing site or seeing social media commentary about a pharmaceutical are signals that could influence your forecast. Beyond the technology, it also means breaking down silos and collaborating seamlessly across all functions in the supply chain.

What interesting applications of advanced analytics are you seeing in your role as Thought Leader at Kinaxis?

I'm seeing the use of machine learning for demand sensing and to detect and correct master data errors. I am also seeing the combination of heuristics and optimization to narrow the data set used for optimization models so that they solve faster and enable rapid scenario analysis. This creates a balance between the need for speed and the need for precision.

Any advice for young people looking for an executive career in demand planning and supply chain?

Big data and sophisticated software solutions require a very specific set of skills. Take statistics courses, linear programming, analytics and R, data science, and even python and C++ programming. You don't have to be an expert, but you do need to understand them.

Be the kind of person who others love to work with and who delivers on their commitments. Never stop being curious. Be lazy and look for better ways to get more done in less time and make better decisions.

Whenever you see an excel spreadsheet run as fast as you can, that is the sign of a process break. Work closely with the commercial organization, finance, manufacturing, product development, regulatory, and strategic planning. Listen to them, understand their perspectives and be willing to change your mind.

Does the choice of degree matter when entering supply chain management?

Yes it does. Before supply chain became a discipline, I looked for industrial engineers, operational researchers, database specialists, programmers, and statisticians. Not for every role but I liked to "pepper" my organization with those skills. Now universities have dedicated supply chain programs that focus on the technical skills mentioned above as well as techniques and processes. Of course my background was in immunology and biochemistry and I have seen others from various backgrounds succeed in supply chain. Curiosity and continuous learning can quickly bridge educational gaps.

What's the best piece of advice you've received?

Be nice to people on your way up in an organization because you will meet them again on your way back down! Joking aside, a long time ago I read *Mover of Men & Mountains* by R. G LeTourneau - look him up. As a young man working in a foundry, the author was pulled aside by his boss and told "Son, I don't want you to work harder, I want you to work faster". He went on to become a prolific inventor of earth moving machinery. So work faster and not harder is my advice; it will change your entire outlook.

Also, focus on your sphere of influence and don't be distracted by your sphere of concern. Be really good at what you do and don't waste your time worrying about things that you have little or no control over.

Any books you'd recommend, business or otherwise?

The Goal by Eliyahu Goldratt, *Managing Operations Across the Supply Chain* by Morgan Swink, *Reengineering the Corporation* by Michael Hammer, *Production and Inventory Control* by George Plossi, and *Mover of Men & Mountains* by R. G. LeTourneau.

—Send comments to JBF@ibf.org

IBP Isn't Working For Larger Companies —What's the Solution?

By Dean Sorensen

EXECUTIVE SUMMARY | Mature forms of integrated planning enable businesses to manage customer expectations while optimizing cost and profit. While Integrated Business Planning (IBP) and Financial Planning and Analysis (FP&A) processes often meet the needs of smaller manufacturers, this is not always the case for global manufacturing organizations. In this article I discuss how four critical capability gaps are falling between the cracks of IBP and FP&A processes and technologies, ones that prevent GMOs from optimizing enterprise costs, profit, cash flow, working capital and enterprise value.

DEAN SORENSEN | Dean is an IBP, FP&A and transformation expert, with an extensive career in consulting having worked for Accenture, KPMG and AT Kearney, advising on finance strategy, cost and performance management and IBP. He is a former Editor of Integrated Business Planning at the International Institute of Forecasters and founder of consulting firm, IBP Collaborative. A chartered accountant, he holds a degree from Schulich School of Business at York University, Toronto.

The roots of IBP are in S&OP, a cross-functional process that aims to balance supply and demand. It is usually described as a monthly five-step process, with a time horizon between 12 to 24 months. Proponents often describe it as an effective mechanism for translating demand signals into resource requirements.

A key component of S&OP/IBP are operational planning models such as bills of materials and routings. They provide the means to maximize order fulfillment rates and revenue while minimizing inventory investment, production, and supply costs. In other words, S&OP is a way of managing trade-offs between delivering good customer service and operating at desired supply costs.

When financial information is added to S&OP, what results is what is commonly known as IBP. This process is described in different ways; IBP objectives can vary from narrow to broad based ones. The primary objectives of IBP are to balance supply and demand, maintain cross-functional alignment, optimize costs and profits, optimize product portfolio value and maintain one source of truth.

IBP has proven to be highly effective for those that achieve these objectives. Armed with an understanding of

Figure 1 | Example of taking a value-centered decision that optimizes value

A potential customer seeks to buy a product that is similar to one that a manufacturer already produces. However, the existing product has higher quality materials, resulting in unit costs that are higher than the customer's target. In order to meet such targets, a typical response would be to create a new product with materials of lower quality and cost. However, such decisions can lead to lower cash flows when incremental sourcing, quality, production planning, material management, distribution, and inventory carrying costs are considered. In such situations, the right decision might be to sell the higher quality product at lower prices, thereby yielding higher EBITDA and cash flow. This is an example of a decision that maximizes value at an enterprise level.

resources required to support sales forecasts, manufacturers have been able to reduce supply chain costs and inventory while also increasing sales and customer satisfaction.

The chances of achieving these objectives are much higher in smaller manufacturers. They aren't encumbered by the complexity factors faced by GMOs such as operating at scale, globalization, organizational structure, variability, and rapid change. IBP also works well in smaller manufacturers because overhead costs aren't significant or variable enough to materially impact decisions. As such, assumptions about their behavior can be used to simplify IBP. This way, IBP processes can stay focused on supply chain costs and still be an effective business tool.

In GMOs these assumptions are not always appropriate as overhead costs become increasingly relevant to decision making, especially in GMOs pursuing digital and other customer-centric strategies where resource consumption is more likely to vary by product and customer. In such cases, IBP isn't always the strategic and enterprise process that its proponents describe. While it enables GMOs to manage margins, supply costs and inventories, it doesn't always enable them to manage enterprise costs, profit, cash flow, and working capital. In other words, GMOs are not achieving mature forms of integrated planning.

WHAT FINANCE LEADERS EXPECT FROM FULLY INTEGRATED PLANNING

This reality is now becoming clear to Finance executives. Many expected the combination of IBP and Financial Planning and Analysis (FP&A) processes and solutions to support 'fully integrated' processes that enabled dynamic cost and profit optimization, a state of maturity where:

- Business objectives and targets are translated into executable plans and accurate projections of free cash flow and operational resource requirements
- Inventory levels and cost structures quickly self-adjust to changing priorities, market conditions, and customer expectations to deliver targets for EBITDA, cash flow, and working capital
- Targets are set based on scenarios that quickly and simultaneously optimize financial and operational constraints and outcomes, in terms of their impact on enterprise revenues, profits, cash flows, working capital, inventories, and operational resources

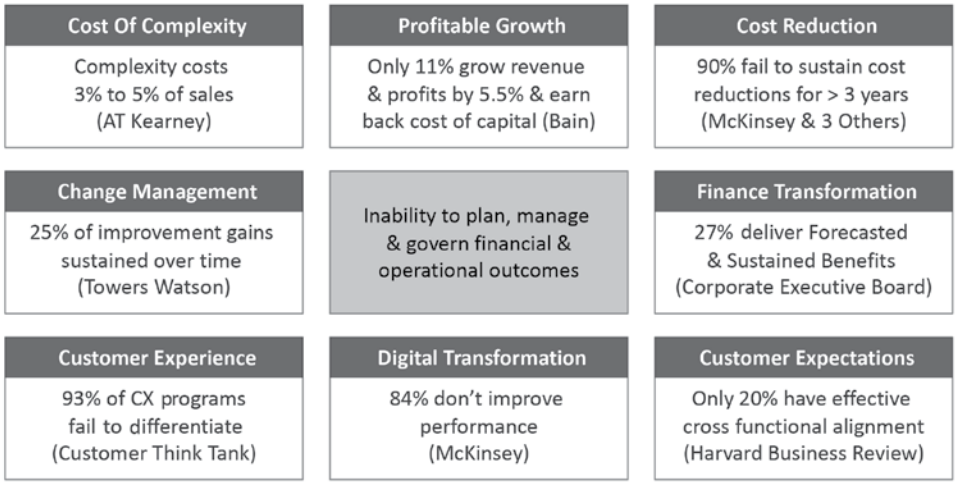
What's being recognized is that few GMOs achieve such maturity levels. After many years of using technology-enabled rolling forecasts and S&OP/IBP, what's being experienced are financial and operational processes that are connected but not sufficiently integrated in a way that enables GMOs to manage complexity and promote value-centered decisions.

VALUE CENTERED DECISIONS

Value-centered decisions are ones that optimize value for customers, stakeholders and shareholders. New product development and customer acquisition are classic examples of processes where GMOs struggle to make such decisions. This is significant because decisions made in these processes can affect multiple functions and can lock in 70% to 80% of GMO cost structures. In GMOs, complexity makes it increasingly difficult to make value-centered decisions that optimize the value of product, customer and supplier portfolios — a reality that is illustrated by the example in Figure 1.

GMOs often have critical capability gaps that undermine their ability to promote value-centered decisions. The most visible one is that they can't always quantify how decisions about product design, customer service and supplier selection affect free cash flow, which is a proxy for value. Without capabilities that can cope with complexity, GMOs are more likely to make wrong decisions that erode value by increasing complexity costs — a term describing the difference

Figure 2 | **Research findings showing how IBP fails to optimize value in GMOs**



in value between actual and optimal decisions, expressed in terms of their impact on free cash flow. In GMOs, the cost of complexity can approach 5% of sales, a huge number for any large scale business. What's more, this value erosion can be experienced in different ways, as illustrated below in Figure 2.

These and the other research results represent classic examples of challenges associated with horizontally-based business initiatives. What's common to them is that their success and value is based on improving financial and operational outcomes horizontally across functions, business units and legal entities. The problem is that GMOs don't plan, manage and govern this way. Rewards and decision rights typically follow the functionally-based budgeting and reporting processes. As a result, traditional vertically-based FP&A processes and tools are not completely aligned with the horizontally-based strategies that GMOs typically pursue. This is the alignment issue that faces Finance executives today.

FATAL FLAWS IN IBP

This alignment issue in not new, especially for those having experience with activity-based costing (ABC) — a method for accurately allocating overhead costs. Apart from learning that product and customer profitability is often materially misstated by these overhead rates, ABC projects consistently expose four critical flaws in traditional planning and performance management processes and technologies.

- They perpetuate functional silos that undermine strategy, even though they may fix data silos
- They lack formal and effective mechanisms for optimizing value and aligning revenues with resources
- They provide financial models that are overly simplistic and often wrong, thereby preventing GMOs from preventing the type of value erosion that ABC identifies
- They don't enable GMOs to establish effective accountability for the profitability of global business units, product and customer portfolios

REQUIRED CAPABILITIES

The complication is that this alignment issue is not always on the radar screen of IBP and FP&A solution providers. This is because they provide functionally integrated solutions — not ones supporting enterprise integration. As a result, critical capability gaps are falling between the cracks of solution providers. What's missing are four critical capabilities that support enterprise integration:

1. ***Integrated Scenario Planning:*** Here the desired outcome is to quickly and accurately quantify enterprise resource requirements while optimizing value and cash flow. A single planning model quantifies how resources are consumed by functions, activities, processes, entities and segments and their impact on free cash flow and EBITDA across both short-

Figure 3 | Desired outcomes of a planning process & the questions we must answer to achieve them

Desired Outcomes	Questions to Answer to Achieve These Outcomes:
• High level integrated process design • Key requirements of the process • Key changes that the process will introduce • Key behavioral changes required • Key performance indicators of the process • Expected value and benefits of the process • Integrated P&PM team leadership needs • Instructions for detailed design team	• What's missing from traditional 5-Step processes? Why aren't IBP objectives achieved? • What activities comprise fully integrated IBP and rolling forecasts? • What capabilities are missing from traditional IBP and FP&A software solutions? • What incremental capabilities do mature forms of integrated P&PM processes provide? • What technology innovations enable these mature forms of integrated P&PM processes? • How do mature forms of integrated P&PM processes support the strategy of GMOs? • What process and behavioral changes are required to maximize the value of IBP? • What change management activities enable successful implementation of such processes?

and long-term timeframes. Only when armed with this information can financial optimization happen.

2. ***Productivity Management:*** The objective here is to eliminate functional silos while enabling fluid resources that can be quickly allocated to where they are needed most. This is achieved by focusing people on cross-functional productivity targets (i.e. cost per outcome) rather than fixed annual budgets. A key enabler of this change stems from reconciling functionally-based financial information to outcome and activity costs, the latter providing the foundation of accurate productivity measurement.
3. ***Outcome and Tradeoff Management:*** Here the objective is to establish formal mechanisms for optimizing value, while also ensuring that enterprise and segment-specific targets are adequately funded and resourced. This is achieved by explicitly planning and managing tradeoffs (between cost, service and quality) at all levels, horizontally across functions and entities. For example, tradeoff measures for an order fulfillment process would be cost per order, perfect order fulfillment, and days in receivables, which could be measured in the aggregate or by individual country, business segment or customer type.
4. ***Concurrent Processes:*** Here the objective is to quickly reset targets and reallocate resources, at all levels of a GMO and the business units that comprise them. This entails the simultaneous execution of strategic, financial, and operational planning and performance management processes, horizontally across functions and entities, at multiple levels of aggregation.

Collectively, these four capabilities enable internal market mechanisms that enable GMOs to effectively manage the expectations of both internal and external customers, a capability that is essential for effectively executing digital and other customer centric strategies.

PLANNING FOR FULLY INTEGRATED PROCESSES

There are many reasons why GMOs don't achieve the value from IBP that smaller companies enjoy. One of the primary factors is that GMOs don't always set the right direction at the outset. What's often missing is holistic executive education surrounding planning that goes beyond traditional forms of functionally-integrated processes like IBP. In Figure 3 are the required outcomes of a planning process, along with questions that need to be answered by executives to achieve them.

What underlies this broader planning approach is a recognition of one reality about mature and "fully integrated" P&PM processes. That being, IBP and rolling forecasts comprise the same process, a key output of which is accurate and timely of cash flow forecasts. In order to realize their full potential, these processes cannot be developed and implemented in silos. What's required is a single team that is tasked with establishing shared processes that support both finance and operations. The executive team must provide this direction, while also specifying the critical capabilities these processes must have.

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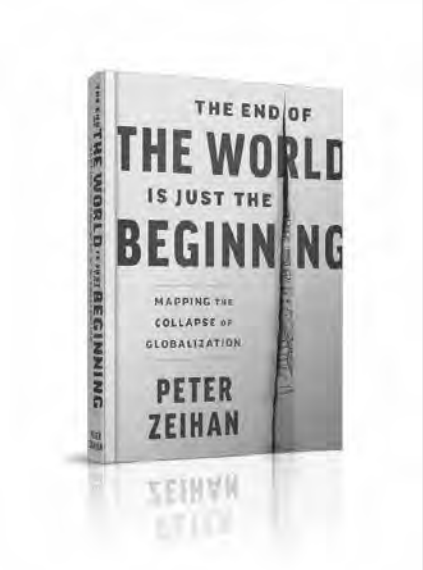
BOOK REVIEW

The End of the World is Just the Beginning

Peter Zeihan



Review by Andrew Scuoler CPF

Peter Zeihan's *The End of the World is Just the Beginning* presents a vision of the future where the USA steps away from its role as world policeman, with countries across Europe, Asia and the Middle East left to fend for themselves, both in terms of trade and militarily. Whether it's the Strait of Hormuz or the South China Sea, without the US securing supply routes, international trade is a thing of the past. In this dystopian paradigm, just a small handful of countries will survive.

No, this isn't a fantasy-inspired novel; it's a serious look at how global trade is unravelling by a highly-regarded geopolitical analyst. To understand the themes in the book, one must accept certain assumptions, key among them that following the Second World War, the United States ushered in a new era of global trade, breaking the imperial model and granting the world unfettered access to global markets. With American naval supremacy guaranteeing the security of shipping lanes, from the mid-1940s onwards, any country with a port could trade freely anywhere in the world. Under this system, the low wage, economic backwaters of Japan, China, Korea, Saudi Arabia and the UAE (among others) boomed.

Of course, nothing is free; in exchange for this privilege, the US

made it a condition that any country in the network of global trade would act as a bulwark against America's great enemy of the 20th century, the Soviet Union. In short, the US bought allies in the fight against its ideological enemy, swapping mass exports for global military hegemony.

END OF THE US- LED WORLD ORDER

Fast forward 70 years and the successor to the Soviet Union no longer presents a major threat to American interests and the conditions that gave rise to the current order no longer exist. And given the US operates at a hefty trade deficit ($1.1 trillion) with the rest of the world, there is no reason to keep patrolling the world's oceans and shipping lanes.

The US is already retreating militarily, Zeihan asserts, "From 1970-2008 the Americans nearly always had a carrier group in the Persian Gulf…but since 2015 it has become normal for the Americans to go months with no ships of size in the region at all." Factor in withdrawal from Iraq, Afghanistan, and tepid responses to the Syria War, the Russo-Ukranian War, and the Taiwan issue, and we are to infer that the US is in slow retreat from the world stage.

The author states that the US is retreating economically, too. And he's right. Recent data from the Reshoring Initiative reveals a record number of jobs being brought back to the US, some 350,000 in 2022 compared to 260,000 in 2021. That's a not a new trend either; 1.6 million jobs have been brought back to the US since 2010. Manufacturing is coming home.

This book is full of surprises, not least that the US is the least economically interconnected country in the world. Research from the Peterson Institute for International Economics backs this up: International trade represents less than 30% of US GDP and has been steadily declining since 2011. For comparison, international trade accounts for 90% of Germany's GDP, 65% for Canada and France, with the world average being 60%.

Ample food and energy resources and strong domestic consumption mean the US can survive outside of a global trading system. Further, a favorable geographic positioning next to trading partners Canada and Mexico present a positive picture for the US in an increasingly fragmented world.

Incidentally, US trade within NAFTA stands at $386 billion compared to $329 billion with China, Japan, Taiwan and Korea combined, with the former steadily rising and the latter steadily decreasing. Zeihan predicts the US is the only country in the world that can survive and thrive by itself, with the possible exceptions of Sweden, France, and New Zealand who, like the US, have the capacity for energy and food sustainability.

PAPER TIGERS?

Zeihan argues that the US is in the process of returning to a pre-WW2 state of isolation, meaning that the golden age that turned Asian and Middle Eastern backwaters into economic powers will end. Beyond losing western export markets, the author touches on numerous factors that will drastically change the fortunes of Asia. Catastrophic demographics and the resulting collapse of domestic consumption will end any ambitions China had for regional hegemony; India, with its wage-variety will emerge as a major exporter; Japan, with the world's second largest navy will dictate who trades with whom, and will use its capital markets to finance India's ascent into the region's manufacturing powerhouse.

The author notes, "With the notable exception of Japan, none of the notable powers have the ability to secure its own supply or trade lines. It is difficult to evaluate who is in a worse position—South Korea and Taiwan who suffer near complete dependence on American strategic overwatch, or China, who would have to punch through the waters of multiple hostile combatants including all the countries of the chain, plus half a dozen more chokepoints to reach any market or resource that matters, using a navy only capable of coastal operations."

THE END OF THE WORLD?

So, how does the world end? Simply put, the world will lose access to the raw materials required for industrialization. Whether it's iron ore, copper and aluminum for heavy industry, or the cobalt required for electric vehicles, or that inert store of value, gold, all countries will experience shortages. Entire economies have been built on access to these materials, Zeihan observes, "The [American]

order established stability which fostered economic growth, which enabled technological advancement, which led to the availability of these materials which allowed their inclusion in the products, modernity and lifestyle of the modern age." Take away these materials and countries lose the foundations of their economies—and modernity— itself.

Zeihan continues, "With the exception of the US who will maintain access to the western hemisphere and Australia, as well as the military capacity to reach anywhere in the world, no one will be able to access all the necessary materials…a few countries with local deposits or militaries with reach can try but it's a short list: the United Kingdom, France, Turkey, Japan and Russia. For the rest, there is a very real risk of reverting not simply to the economic and technological levels that pervaded before 1939, but to before the industrial revolution itself." Civilization as we know it is at stake, unless you're American!

Such seismic changes would inevitably have impacts on supply chains and operations management. In this new world, Zeihan expects that NAFTA will become increasingly important. The proximity of Mexico and Canada lowers supply chain complexity for the US, having none of the geographical or political risks associated with countries like China. He observes that the wage of variety of Mexico keeps costs relatively low (for low-end, outsourced manufacturing) while also providing a growing consumer base for exports. Zeihan observes that the easy logistics of trading with Mexico and Canada can support the American proclivity for the Lean methodology and Just-In-Time delivery, something that Asian countries can only support under perfect conditions.

It is up for debate how our relationship to the Lean methodology will evolve, with both Larry Lapide and Patrick Bower questioning our approach to extended supply chains and lean inventory policies in this very issue of the *Journal*. In bringing trade 'home' to within NAFTA from the Far East, we may just find a solution to the overly-complex, over-optimized and vulnerable supply chains that crippled us during COVID, and Just-in-Time may well live on.

SEISMIC CHANGES —FOR THE WORLD & FOR SUPPLY CHAINS

You'll find no short of hyperbole in this book with a lot of predictions presented as fact. The future is impossible to predict with as much certainty as the author would have us believe and there is no consensus as to how trade will evolve.

But his broad brushstroke observations are correct—the US is indeed retreating from the global trade framework they built and without the world's largest economy and military, that framework will inevitably change. While we can't say for sure how things will evolve, we know that global trade won't become any more secure or open.

Further, we have seen how COVID has forced a reassessment of our weak (and increasingly costly) supply chains with American firms responding by repatriating production. We have seen how the Trump/Biden tariffs are diminishing the trade relationship between the US and China, and we know the US enjoys energy and food independence. All this points to a future of increased withdrawal from the global system.

It behooves us to consider multiple scenarios rather than hang our hats on a singular outcome, but consider this: If Supply Chain Management was developed to meet the needs of trade in a globalized world, how will it change if globalization ends?

—Send comments to JBF@ibf.org

We Were Already Broken — How Supply Chains Were Primed For Failure Before COVID

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I suspect most of your problems and risk will fit into one of the categories mentioned above. Then the real work begins — de-risking your supply chain to reinforce the flexibility, buffers and relationships needed to survive the next disruption. Because there will be another disruption.

—Send comments to JBF@ibf.org

Learn to Respect 'Good' Inventories: Rethinking Lean Methodology

continued from page 18

ue of inventory. The company should be less worried about surplus inventories from the past, and more worried about deploying good inventories to meet post-pandemic demand. They should educate their executives to have a healthy respect for inventory so that managers don't go overboard and throw 'bad' inventory after 'good'. Because when times are tough you have to have the goods.

—Send comments to JBF@ibf.org

The Rise of S&OE: Achieving Organizational Objectives with Improved Execution

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than expected lead times, alternate suppliers can be sourced. The S&OE team will leave longer-term risks and opportunities and overall cost and lead-time reductions to the S&OP/IBP team. See Figure 2 to see where S&OE integrates into S&OP/IBP.

As Albert Einstein said, "Insanity is doing the same thing over and over and expecting different results". Experiences of global leaders confirm that getting people to change and adopt new ways of thinking is one of the biggest barriers for middle managers when rolling out or upgrading a new S&OP/IBP or S&OE process. Most company cultures have been formed over decades, requiring major disruptive events or changes within the top-level management to realize significant shifts in behavior.

The positive news for those companies interested in implementing these changes is that the current business environment, with its major disruptive events, has driven many executive teams to move away from the old-school, siloed mindset. COVID has forced an appreciation for both tactical and mid- to long-term planning, making businesses ripe for adoption of new processes.

To close, do not worry about the acronyms referred to in this article (there is no correlation between what you call your planning process and its success). Instead, focus on whether your company has a process that brings different functions together to help your organization leverage its competitive advantages within your industry.

—Send comments to JBF@ibf.org.

IBP Isn't Working For Larger Companies – What's the Solution?

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By using such a holistic approach, GMOs can establish fully integrated processes that reduce the cost of complexity (by 3% to 5% of sales), reduce the cost of planning by as much as 50%, collapse annual budgeting processes to less than 1 month, while also reducing the cost of planning and managing GMOs by upwards of 50%

Armed with this understanding, strategically-focused finance executives can play a central role in shaping the design and implementation of mature forms of integrated P&PM processes. In so doing, they can help GMOs to avoid the pitfalls of traditional IBP processes, while also transforming finance into a more effective functions that are aligned with the business. As a result, GMOs will be better equipped to capitalize on significant and untapped sources of value.

—Send comments to JBF@ibf.org

As Central Banks Tighten to Tackle Inflation, Global Recession Looms

By Nur M. Onvural

Dr. Onvural is Professor of Management at Campbell University's Adult & Online Education Division and Lundy Fetterman School of Business, teaching online Applied Economics for Business Leaders and Healthcare Finance in the MBA program as well as Quantitative Methods for Business and Economics to Adult & Online Education students.

PARTICIPANTS | Conf. Board = Conference Board, New York, New York; Fannie Mae = Fannie Mae, Washington, D.C.; GSU - EFC = Georgia State University, Economic Forecasting Center, Atlanta, Georgia; Moody's Economy = Moody's Economy.com, Westchester, Pennsylvania; Mortgage = Mortgage Bankers Association, Washington, D.C.; NAM = National Association of Manufacturers, Washington, D.C.; Perryman Gp = The Perryman Group, Waco, Texas; Royal Bank of Canada, Toronto, Ontario, Canada; S&P = Standard & Poor's, New York, New York; US Chamber = U.S. Chamber of Commerce, Washington, D.C.; Wells Fargo = Wells Fargo Bank, San Francisco, California.

Expectations for the U. S. economy in the fourth quarter of 2022 point to slim growth. Consensus anticipates the nation's GDP growth rate to remain at around 0.4% well into third quarter of 2023. According to Dr. Ray Perryman of the Perryman Group, the solid job growth in recent months (August unemployment stood at 3.7%) suggests that recessionary fears are overblown, even considering the two-quarter decline in GDP (much of which is attributable to rising exports, which indicates progress on supply chain issues). Similarly, Wells Fargo believes that broad economic activity is not consistent with a downturn yet due to the strength of the labor market as employers hired at a robust pace in the second quarter of 2022, adding 1.2 million jobs with over half a million in July alone. It's tough to square these robust hiring figures with an economy in recession.

Nevertheless, in his economic forecast for the nation, released on Aug. 31st, Rajeev Dhawan of Georgia State

University described the current economic condition as "bearflation" which he defines as "a combination of hot inflation, accompanied by sharp stock market declines at near full-employment, in the face of an energy crisis that is eroding consumer confidence, thereby making corporations hesitant to invest in capital expenditures – which will turn the current stall in income growth into an NBER (National Bureau of Economic Research) style recession as the Fed remains resolute with interest rate hikes."

While recent declines in the price of crude oil (about $86 a barrel in September) have eased the price of gas at the pump, there is still an expanded money supply available in the economy, with M2 at more than $21,700 billion in August. Given that, Perryman indicates that inflation and rising interest rates create some headwinds and employment expansion is likely to moderate in the coming months.

CONSUMERS: SPENDING DECREASES AS WEALTH EFFECT IS ERRODED

A strong job market and steady increases in consumers' personal disposable incomes should help raise consumption and improve economic growth. However, Americans' wealth has taken a hit via sharp stock market declines. Volatility in the stock market with the S&P 500 below 4000 contributes to a decrease in consumer spending as the wealth effect is eroded. Similarly, light vehicle sales forecasts during the Consensus period reveal that auto purchases are likely to increase by only 2.5% during the first half of 2023 and then increase to 4.86% well into the third quarter of 2023. This is an indication of both uncertainty and carefulness on the part of consumers in their big-ticket item purchases, signifying that economic growth is likely to moderate, representing a slowdown intensified by persistent inflation pressures.

The ratio of Personal Consumption Expenditures to Personal Disposable Income is predicted to remain at around 92% during the Consensus period. This is heavy consumption, impacting household saving and pushing consumers to utilize their credit cards heavily. The increase in Personal Disposable Income is expected to remain around its current level of 3.14%, whereas the increase in Personal Consumption Expenditures goes up to 3.79% between the fourth quarter of 2022 and the third quarter of 2023. This implies consumers are reaching deep into their pockets to find the means to continue spending in the face of the highest inflation in 40+ years. In other words, in order to keep spending, households are putting off saving. According to Rajeev Dhawan of the Georgia State University, energy-price-hike-induced inflation has cratered domestic consumer confidence, signaling less spending in the coming months. As a result, C-suite confidence is low, translating into weak capital expenditures.

Chained Price Index growth is expected to be 2.30% vs. growth in the Consumer Price Index of 2.16% for the Consensus period. (The chained price index is a measure of price levels of consumer goods and services based on consumers' behavior of substituting products with less expensive ones in an inflationary environment). As such, consumers are substituting more expensive goods and services with less expensive choices.

FIRMS: CAPITAL EXPENDITURE DROPS, GDP GROWTH SLUGGISH DESPITE PRODUCTIVITY

Consensus expects the unemployment rate (3.7% in September) to change somewhat from its projected 3.67% in the fourth quarter of 2022 to 4.27% in the third quarter of 2023. Similarly, Wells Fargo expects payroll growth to slow down and to turn negative in the spring when tight monetary policy tips the US economy into a recession. The expectation for unemployment late next year is around 5%. As such, they predict a mild recession by the beginning of 2023 as aggressive Fed tightening aims to tame persistently high inflation. Likewise, Perryman expects employment expansion to moderate in the coming months.

Industrial Capacity Utilization is expected to stay at 80% well into the third quarter of 2023. Non-Residential Fixed Investment is expected to grow by only about 1%—slightly greater than expected GDP growth from fourth quarter 2022 to third quarter 2023. This is sluggish growth considering the continued improvement in productivity and the competitiveness of the U. S. economy. Wells Fargo slightly lowered their growth estimates in response to lower oil price forecasts and declines in manufacturing projects. Dhawan believes the key driver of economic growth is capital expenditures, which he expects to decline because of plummeting confidence of CFOs (Chief Financial Officers) in the economy. Capital expenditure spending done today

PARTICIPANTS	GROSS DOMESTIC PRODUCT (GDP) Bil. of Chained 2012 Dollars | Level				PERSONAL DISPOSABLE INCOME Based on GDP Concept | Curr. Bil. of $, Level (SAAR)			
QUARTER	**22-4**	**23-1**	**23-2**	**23-3**	**22-4**	**23-1**	**23-2**	**23-3**
Conf. Board | Erik Lundh	19,692.69	19,670.02	19,694.51	19,791.69	NA	NA	NA	NA
Fannie Mae | Doug Duncan	19,807.00	19,778.00	19,699.00	19,675.00	19,131.00	19,359.00	19,628.00	19,899.00
GSU-EFC | Rajeev Dhawan	19,745.28	19,764.12	19,761.66	19,800.76	19,061.95	19,431.81	19,717.70	19,981.14
Moody's Economy | Mark Zandi	19,811.03	19,888.35	19,977.18	20,092.53	19,093.77	19,376.19	19,635.94	19,898.24
Mortgage | Mike Fratantoni	NA	NA	NA	NA	NA	NA	NA	NA
NAM | Chad Moutray	19,815.00	19,890.00	19,980.00	20,095.00	19,095.00	19,380.00	19,635.00	19,900.00
Perryman Gp | Ray Perryman	19,974.59	20,119.89	20,268.22	20,423.34	18,946.53	19,158.59	19,336.44	19,520.60
Royal Bank of Canada | Craig Wright	19,824.40	19,808.60	19,789.90	19,791.50	NA	19,455.30	18,137.40	18,182.70
S & P | Beth Ann Bovino	NA	NA	NA	NA	19,101.78	19,336.38	19,653.27	19,982.75
US Chamber | Curtis Dubay	19,872.00	19,972.00	20,072.00	20,172.00	19,083.00	19,388.00	19,698.00	20,013.00
Wells Fargo | Jay Bryson	19,798.20	19,756.00	19,641.40	19,568.60	NA	NA	NA	NA
Consensus	**19,815.58**	**19,849.67**	**19,875.99**	**19,934.49**	**19,073.29**	**19,360.66**	**19,430.22**	**19,672.18**

PARTICIPANTS	PERSONAL CONSUMPTION EXPENDITURE Based on GDP Concept | Curr. Bil. of $ | Level (SAAR)				CONSUMER PRICE INDEX 1982-1984=100 | LEVEL			
QUARTER	**22-4**	**23-1**	**23-2**	**23-3**	**22-4**	**23-1**	**23-2**	**23-3**
Conf. Board | Erik Lundh	NA	NA	NA	NA	NA	NA	NA	NA
Fannie Mae | Doug Duncan	17,524.00	17,663.00	17,724.00	17,805.00	298.50	300.00	301.10	302.10
GSU-EFC | Rajeev Dhawan	17,306.14	17,465.38	17,621.27	17,783.46	298.05	300.58	302.82	304.61
Moody's Economy | Mark Zandi	NA	NA	NA	NA	297.49	299.65	301.51	302.86
Mortgage | Mike Fratantoni	NA	NA	NA	NA	NA	NA	NA	NA
NAM | Chad Moutray	NA	NA	NA	NA	297.50	299.70	301.50	302.90
Perryman Gp | Ray Perryman	17,564.32	17,840.54	18,112.70	18,354.73	298.63	301.10	303.65	306.05
Royal Bank of Canada | Craig Wright	NA	NA	Na	NA	295.30	296.70	299.40	300.80
S & P | Beth Ann Bovino	NA	NA	NA	NA	296.54	298.77	300.34	301.89
US Chamber | Curtis Dubay	17,700.00	18,061.00	18,430.00	18,805.00	299.85	305.12	311.56	313.56
Wells Fargo | Jay Bryson	NA	NA	NA	NA	298.50	300.60	301.90	303.50
Consensus	**17,523.61**	**17,757.48**	**17,971.99**	**18,187.05**	**297.82**	**300.25**	**302.64**	**304.25**

UNEMPLOYMENT Civilian % (SAAR)				NON-RESIDENTIAL FIXED INVESTMENT (Bil. of Chained 2012 Dollars)			
22-4	**23-1**	**23-2**	**23-3**	**22-4**	**23-1**	**23-2**	**23-3**
3.60	3.70	3.90	3.90	2,965.01	2,946.52	2,939.94	2,958.29
3.50	3.90	4.40	4.90	3,035.00	3,004.00	2,945.00	2,900.00
4.02	4.15	4.39	5.02	3,017.82	3,026.44	3,040.33	3,054.33
3.69	3.81	3.91	3.95	3,094.04	3,136.99	3,166.57	3,186.45
NA	NA	NA	NA	NA	NA	NA	NA
3.70	3.80	3.90	4.00	3,095.00	3,140.00	3,170.00	3,190.00
3.40	3.40	3.30	3.40	3,051.55	3,078.80	3,121.54	3,149.41
4.00	4.20	4.50	4.70	3,017.40	3,032.30	3,048.50	3,066.60
3.65	3.80	4.03	4.22	NA	NA	NA	NA
3.50	3.70	3.90	4.00	NA	NA	NA	NA
3.60	3.80	4.10	4.60	3,029.50	3,042.10	3,027.90	3,007.10
3.67	**3.83**	**4.03**	**4.27**	**3,038.17**	**3,050.89**	**3,057.47**	**3,064.02**

INDUSTRIAL CAPACITY UTILIZATION (SAAR)				MONEY SUPPLY M2 Bil. of $, Level (SAAR)				PRIVATE HOUSING START TOTAL Mil. of Units (SAAR)			
22-4	**23-1**	**23-2**	**23-3**	**22-4**	**23-1**	**23-2**	**23-3**	**22-4**	**23-1**	**23-2**	**23-3**
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	1.37	1.29	1.28	1.31
77.52	76.93	76.52	76.21	NA	NA	NA	NA	1.42	1.38	1.34	1.31
81.73	81.91	82.07	82.43	21,003.85	20,881.74	21,013.41	21,235.24	1.59	1.56	1.55	1.56
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
81.50	81.60	81.70	82.00	21,000.00	20,885.00	21,015.00	21,235.00	1.40	1.42	1.45	1.55
80.20	80.50	80.30	80.40	21,996.93	22,188.24	22,392.22	22,575.22	1.78	1.81	1.59	1.63
NA	NA	NA	NA	NA	NA	NA	NA	1.37	1.35	1.35	1.35
NA	NA	NA	NA	22,459.29	22,705.69	22,966.41	23,240.00	1.52	1.51	1.48	1.48
NA	NA	NA	NA	21,153.00	20,866.00	20,578.00	20,291.00	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	1.61	1.62	1.55	1.51
80.24	**80.24**	**80.15**	**80.26**	**21,522.62**	**21,505.33**	**21,593.01**	**21,715.29**	**1.51**	**1.49**	**1.45**	**1.46**

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PARTICIPANTS	TOTAL LIGHT VEHICLE SALES FOR & DOM. | Mil. of Units (SAAR)				CHAINED PRICE INDEX 2000 | Level			
QUARTER	**22-4**	**23-1**	**23-2**	**23-3**	**22-4**	**23-1**	**23-2**	**23-3**
Conf. Board | Erik Lundh	NA	NA	NA	NA	NA	NA	NA	NA
Fannie Mae | Doug Duncan	14.80	15.00	14.90	15.10	136.60	137.90	139.00	140.00
GSU-EFC | Rajeev Dhawan	14.47	14.24	14.15	14.24	128.80	129.98	131.27	132.37
Moody's Economy | Mark Zandi	15.39	16.01	16.53	16.82	128.99	129.96	130.79	131.58
Mortgage | Mike Fratantoni	NA	NA	NA	NA	NA	NA	NA	NA
NAM | Chad Moutray	15.40	16.00	16.50	16.80	NA	NA	NA	NA
Perryman Gp | Ray Perryman	14.60	15.10	15.60	16.30	129.78	130.96	132.17	133.23
Royal Bank of Canada | Craig Wright	13.40	13.30	13.10	13.20	NA	NA	NA	NA
S & P | Beth Ann Bovino	16.20	16.00	16.20	16.30	128.57	129.58	130.48	131.33
US Chamber | Curtis Dubay	NA	NA	NA	NA	NA	NA	NA	NA
Wells Fargo | Jay Bryson	15.10	15.90	16.20	16.40	128.80	129.70	130.30	131.00
Consensus	**14.92**	**15.19**	**15.40**	**15.64**	**130.26**	**131.35**	**132.34**	**133.25**

PARTICIPANTS	FEDERAL FUNDS RATE %				AAA CORPORATE BOND RATE %			
QUARTER	**22-4**	**23-1**	**23-2**	**23-3**	**22-4**	**23-1**	**23-2**	**23-3**
Conf. Board | Erik Lundh	3.63	3.88	3.88	3.88	NA	NA	NA	NA
Fannie Mae | Doug Duncan	3.33	3.18	2.80	2.60	NA	NA	NA	NA
GSU-EFC | Rajeev Dhawan	3.25	3.63	3.63	3.38	4.44	4.28	4.36	4.41
Moody's Economy | Mark Zandi	3.05	3.29	3.33	3.32	4.56	4.83	4.85	4.90
Mortgage | Mike Fratantoni	NA	NA	NA	NA	NA	NA	NA	NA
NAM | Chad Moutray	3.88	4.13	4.13	4.13	4.56	4.83	4.85	4.90
Perryman Gp | Ray Perryman	2.78	3.13	3.55	3.32	4.72	4.92	4.84	4.59
Royal Bank of Canada | Craig Wright	3.75	3.75	3.75	3.50	NA	NA	NA	NA
S & P | Beth Ann Bovino	3.13	3.29	3.60	3.60	3.76	2.32	2.39	2.46
US Chamber | Curtis Dubay	3.13	3.63	4.13	4.63	4.80	5.00	5.20	5.20
Wells Fargo | Jay Bryson	3.88	3.88	3.88	3.63	4.30	4.60	4.40	4.60
Consensus	**3.38**	**3.58**	**3.67**	**3.60**	**4.45**	**4.40**	**4.41**	**4.44**

generates job growth six to nine months down the road. Hence, he expects capital expenditure spending to cool even further, which will impact job growth significantly in 2023. According to Consensus, light vehicle sales will be around 14.92 million in Q4 of 2022 and are expected to reach 15.64 million in the third quarter of 2023. This growth would represent a total growth of only 4.86%.

Private Housing Starts are expected to go down from 1.51 million units to 1.46 million units between the fourth quarter of 2022 to the third quarter of 2023—a decent 3.00% decline. This will significantly impact employment and economic growth. Dhawan's forecast on housing starts is even more severe, suggesting an average of 1.574 million starts in 2022 and down to 1.280 million in 2023. Accordingly, Wells Fargo have considerably reduced their residential forecast as higher mortgage rates (U. S. mortgage rates touched their highest level in nearly 14 years in early September causing another blow to the rapidly cooling housing market) and rising recession risks have weighed on housing activity. The rise in financing costs will weigh considerably on home buying. This slowdown in home buying will considerably impact job growth and add profoundly to recession risks.

INTEREST, CREDIT, AND THE FED: TIGHTENING TO CONTINUE INTO 2023

According to Consensus, the triple "A" quality corporate bond rate (4.46% in September) is expected to stay steady at around 4.45% in the fourth quarter of 2022 and 4.44% in the third quarter of 2023. On the other hand, Wells Fargo's 2022 year-end forecast for the 10-year Treasure yield is 3.15%, decreasing to 2.70% for 2023 year-end.

Consensus forecasts that the Federal Funds Rate (the interest rate at which depository institutions lend balances to each other overnight), is projected to increase from 3.38% in the fourth quarter of 2022 to 3.58% in Q1 2023, and then stay steady at 3.60% in the third quarter of 2023. These are in line with the 75-bps hike we saw in September's FOMC meeting to bring the range to 3.75-4.00% at the end of 2022. Since raising the federal funds rate makes it more expensive to borrow and lowers the supply of money, these changes are an indication of the Fed's policy to keep inflation under control. Perryman believes that the Federal Reserve may ramp down its rate hikes in 2023, assuming that price pressures will ease modestly. Dhawan predicts that the Fed will cut rates only when job growth has become decidedly negative.

CONCLUSION: EFFORTS TO TAME INFLATION FORESHADOW GLOBAL RECESSION

In summary, the US inflation rate declined less than expected to 8.3% in August. Federal Reserve Chairman Jerome Powell reiterated that the Fed is squarely focused on bringing down high inflation to prevent it from becoming entrenched as it did in the 1970s. Mortgage rates in the US topped 6% for the first time since 2008 before the September FOMC meeting. Moreover, the US yield curve is inverted causing implications for consumers and investors alike. An inverted yield curve means that short-term debt instruments carry higher yields than long-term instruments, suggesting greater economic risk in the near term. It is the most reliable leading indicator of an impending recession.

In other parts of the world, the European Central Bank raised interest rates by the largest amount since the early days of Europe's currency union, moving aggressively to combat record inflation. Rising borrowing costs will increase the risk of a slide into recession for the Eurozone which is wrestling with surging energy costs and sagging confidence among households and businesses, driven by the war in neighboring Ukraine. Speaking of energy costs, the U. K. government plans to cap household energy prices over the next two years, a costly bailout aimed at staving off a deep recession and bringing down inflation, but one that could add to growing worries about the British government's financial health. Also, the Bank of England raised its key interest rate by half a percentage point in its longest cycle of increases since the late 1990s. Consequently, the World Bank believes the world may be edging toward a global recession as central banks across the world simultaneously hike interest rates to deal with persistent inflation.

Considering all these, a possible remedy could be for policymakers to shift their focus to boosting production, inclusive of efforts to generate additional investment and productivity gains as well as putting in place credible medium-term fiscal plans to provide essential support to vulnerable households. Lastly, central banks should communicate their policy decisions more openly to fight inflation and avert a global recession.

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