



Who's in charge? : sales and operations planning governance and alignment in the supply chain management of multinational industrial companies

Richard Markoff

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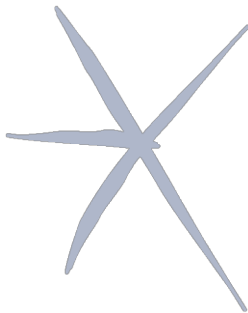


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WHO'S IN CHARGE?
*Sales & Operations Planning Governance and Alignment in the Supply Chain Management
of Multinational Industrial Companies*

THESE



En vue de l'obtention du
DOCTORAT ÈS SCIENCES DE GESTION

Par

Richard MARKOFF

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QUI EST RESPONSABLE ?

Gouvernance du Processus S&OP et Alignement de la Gestion de la Supply Chain des Compagnies Industrielles Multinationales

Le processus S&OP est souvent considéré comme un processus d'alignement de l'offre et de la demande dans les chaînes d'approvisionnement simples et linéaires, avec un seul marché et une seule usine. Les entreprises multinationales présentent aujourd'hui des configurations de chaînes d'approvisionnement plus complexes possédant des usines spécialisées qui desservent plusieurs marchés. Ce papier analyse comment les entreprises multinationales configurent leurs processus de gouvernance S&OP pour relier les usines et les marchés, ainsi que l'influence de cette gouvernance sur leur capacité à obtenir un alignement entre l'offre, la demande, et les plans financiers. Au travers d'entretiens menés avec des entreprises, une typologie est définie pour les modèles de gouvernance S&OP observés. Cette typologie suggère qu'un type de gouvernance S&OP exerçant une autorité, à la fois dans les usines et dans les marchés, conduit à des résultats S&OP plus probants. Un lien est également établi entre l'efficacité des S&OP et les mesures formelles d'alignement pour la planification financière. A partir de ceci, les éléments de Contrôle de Gestion sont précisés pour permettre la conceptualisation des S&OP en reconnaissant l'influence de la comptabilité sur la gouvernance du processus S&OP pour assurer la transparence et l'engagement multifonctionnel dans les contextes de la chaîne d'approvisionnement multinationale. Il en découle quatre règles normatives pour la réussite de la gouvernance et de l'alignement du processus S&OP dans un contexte de configuration de la chaîne d'approvisionnement multinationale.

WHO'S IN CHARGE?

Sales & Operations Planning Governance and Alignment in the Supply Chain Management of Multinational Industrial Companies

S&OP is often seen as a process for alignment between supply and demand in simple, linear supply chains with one market and one factory. Multinational firms today have more complex supply chain configurations that have specialized factories serving multiple markets. This research explores how multinational companies configure their S&OP governance linking factories and markets and the influence this governance has on their ability to obtain alignment between supply, demand and financial plans. Through company interviews, a typology for observed S&OP governance models is developed, and suggests that an S&OP governance type exerting authority simultaneously into both factories and markets leads to more successful S&OP outcomes. A link is also drawn between S&OP effectiveness and formal policies for alignment with financial planning. From this, elements of Management Control are deployed as a framework to furthering S&OP conceptualization by recognizing the influence of accounting on S&OP governance in achieving transparency and multi-functional engagement in multinational supply chain contexts. The result is four normative rules for successful S&OP governance and alignment within a multinational supply chain configuration context.

WHO'S IN CHARGE?

Sales & Operations Planning Governance and Alignment in the Supply Chain Management of Multinational Industrial Companies

PhD Thesis – Richard Markoff

Research Directors: Valentina Carbone and Philippe Zarlowski

ABSTRACT

S&OP is often seen as a process for alignment between supply and demand in simple, linear supply chains with one market and one factory. Multinational firms today have more complex supply chain configurations that have specialized factories serving multiple markets. This research explores how multinational companies configure their S&OP governance linking factories and markets and the influence this governance has on their ability to obtain alignment between supply, demand and financial plans. Through company interviews, a typology for observed S&OP governance models is developed, and suggests that an S&OP governance type exerting authority simultaneously into both factories and markets leads to more successful S&OP outcomes. A link is also drawn between S&OP effectiveness and formal policies for alignment with financial planning. From this, elements of Management Control are deployed as a framework to furthering S&OP conceptualization by recognizing the influence of accounting on S&OP governance in achieving transparency and multi-functional engagement in multinational supply chain contexts. The result is four normative rules for successful S&OP governance and alignment within a multinational supply chain configuration context.

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PROLOGUE

I have over 20 years' experience in supply chains for a major multinational consumer goods firm: L'Oréal. At the start of my career the term 'supply chain' didn't really exist. The most common term was 'logistics'. But logistics didn't really capture what my responsibilities were at the time.

My title was 'Director of Logistics', but the scope of my responsibilities went far beyond the factory warehouse and docks. My team was responsible for all of the coordination and planning that kept the factory running and the customer orders filled. We managed the production planning that determined what we made in response to sales forecasts, identified capacity constraints and helped the production teams size their staffs and working hours. We were also responsible for the supply of packaging materials, a key element as this was the biggest bottleneck in our factory.

Every month I would meet with the executive committee of L'Oréal Canada, joining them for sessions where launches and service issues were reviewed. Ultimately, the senior management at L'Oréal Canada looked to me as the guarantor of their inventory health and service level. And this made sense, because almost everything they sold came from my factory, and almost everything we made at our factory was for them. Our factory was complex, rigid and expensive. L'Oréal would soon decide – as did many consumer goods companies – to rationalize their production and specialize factories by technology for a region or even for the whole world in some cases. There were countless benefits, with returns so

staggering they have never been counted. By specializing our factories, we could avoid capital investments in production assets like vessels and packaging lines. The equipment we already had would be used more fully. For the staff it meant they could develop more focused technical expertise on a smaller scope of products. This expertise would lead to higher production uptimes, less waste and higher quality. More specialization also meant fewer products to plan, less vendors and a less complex upstream supply chain. These benefits all found themselves in the cost of goods, helping the company's bottom line.

This specialization was what led to me entering logistics in the first place. As we began plans to produce goods for the American market, we needed someone who could act as a liaison between the factory and the U.S. business units. A chemical engineer by training, I was working as a production manager at the time. I was also the only management staff in the entire factory who spoke English as their mother tongue. *The only one.* So I was asked to move from production into logistics in order to connect and plan with the Americans about forecasts, product launches, service issues, production transfers and so on. I agreed and moved from a technical role to a more managerial, administrative one, and began contributing to the production specialization in earnest. It was a move that would have huge ramifications for me. In the years that followed, it turned out that I had a knack for supply chain, was promoted a few times, became an ex-pat before it was trendy, moved to Paris and met my wife while there. The evolution of production footprints and their impacts on supply chains literally became the story of my life.

But let's go back to L'Oreal Canada.

The senior management at L'Oréal Canada wasn't pleased, despite the clear benefits that production specialization offered. Over time, less and less of their products were sourced from the local factory. I slowly stopped attending most of the monthly meetings, since I had no information on the service or inventory issues of products imported from other countries. I could only speak to the issues regarding the products sourced from my factory. Over coffee one day the Canada general manager expressed his frustration that he did not have a 'me' any more: that one person he knew and trusted that he could call to deal with any supply chain issue that arose. He was now one of many countries being supplied by a far-off factory. He didn't feel that they knew or understood his market or his needs. He apologized to me for no longer inviting me to the monthly meetings, and I really no longer felt that I was part of his team.

This frustration went even further up the hierarchy. In speaking to the Americas head of one of our business units, he did not understand why he no longer had control over his entire supply chain, as he did in his previous company. I explained that we had established a global footprint and strategy for our manufacturing, a strategy that had one unique source factory for each product globally. For him to control his entire supply chain implied that he, sitting in New York, would have to control factories in western Europe, and the implication of that was

that he would control part of the supply chain of other markets being serviced by those factories.

I had adjustments to make as well. I now had markets to take care of outside of Canada. They didn't work in quite the same way and were no more pleased to be having to work with me than the general manager in Canada was to having to work with non-domestic factories. I experienced first-hand deterioration in collaboration, visibility and proximity to the markets. The planners in the markets working on the demand plans were far away from me and the industrial planners in my team were far away from them.

As my career progressed and I joined the corporate group, I would have the opportunity to design and implement the international supply chain management teams that would help connect the factories with the diverse, far-ranging markets they now served. Just a few years before these teams were not needed, yet here we were engineering new links in the chain from whole cloth, ones that connected factories in one country to markets in another. Even for existing planning functions, there had been a lack of formalization since all of the actors were in high proximity. Establishing links between sales and demand planning all the way to the factory was not challenging when everyone was in close quarters in one local market. New arguments were being heard for the first time in the company about 'whose inventory it was', who was 'to blame for obsoletes' and whose fault it was that service levels were low.

The lack of proximity seemed to go hand in hand with sales and marketing teams distancing themselves from the planning imperatives and 'us' and 'them' mentalities were prevailing. Even between the planners of a factory and a market, the dialogue had transformed from 'we' into a high friction client-vendor dialogue, an almost adversarial relationship.

At the same time, the distance between the upstream and downstream of the supply chain put an even greater importance on demand planning. It was no longer as simple as calling the factory manager or even walking down the hall to his office to explore cost/service trade-offs. Production plans and economic performance were ever more tied to having quality demand plans that anticipated market events like launches, promotions and media campaigns.

The ever widening gap began fostering elaborate gaming of the demand planning exercise by downstream actors in the subsidiaries. A product manager once told me proudly how he had three sets of demand plans for a major shampoo launch: a lowball estimate he provided management in order to lower expectations so that he could surpass them heroically later, a highball one he provided me to be sure he had plenty of inventory and one in the middle that he and his commercial team had aligned on. Another subsidiary decided that their inventory was too high for a particular product family but hadn't considered the long lead time to produce the goods. To remedy this apparent problem they scheduled a promotion and willfully omitted it from the demand plan in an effort to drive down inventory. My factory

could not react to reconstitute the safety stocks and the product family had crippling service issues for weeks afterwards. This wasn't a solid foundation to trigger a sound, successful production and procurement effort around moving forward.

To compensate for all of this and the dispersion and branching out of the local chain to a many-to-many configuration meant that roles, responsibilities and accountabilities needed to be described, standards and process defined and a center of excellence created to drive everyone towards harmonized ways of working.

Eventually, L'Oréal would go further and undertake an important restructuring of the supply chain structure. I had the opportunity to be one of the architects of the new structure. The company put the (relatively) new international supply chain teams in dotted line authority over the planning teams in the markets preparing the demand plans as well as dotted line authority over the teams preparing the production planning in the factories. The goal was to establish an end-to-end authority over the supply chain to promote visibility, reactivity and a holistic efficiency. Leaving the solid line in the factories (for production planning) and markets (for demand planning) allowed for proximity to the local teams. This facilitated the task of the supply chain function of seeking collaboration from the actors influencing the biggest constraints in the supply chain: forecast accuracy and production reactivity.

I soon discovered that my experience was not unique. As my connections to other companies grew, it was clear that almost every multi-national firm was at some stage of this transition, either far along as we were or just beginning the voyage. A picture started forming that the real challenge – and key success factor - of planning the supply chain wasn't really in the technical weeds of safety stock calculations, planning buckets and cycle times, it was in the more murky waters of governance and behavioral influence.

This research stems from this experience and the implications it has for practitioners on the governance of their planning processes. It is informed by my years of experience within L'Oréal and exchanging with counterparts in many other companies.

1. INTRODUCTION

1.1 Introduction to the Thesis

In the past few years the term *Sales and Operations Planning (S&OP)* has become very much a universal term heard in supply chain circles. It is common to encounter arguments that there needed to be an agreement between sales, marketing, finance and the supply chain around what the demand plan should be each month, or week (Thome, Scarvarda, Fernandez and Scarvarda 2011). However, benchmarking with other multi-national companies revealed, at least anecdotally, that there was nothing close to a consensus around how these companies were structuring their planning process. The key questions were around how to secure the adherence and engagement of all of the actors needed to reach an agreement on the different types of plans in a company (Mansfield 2012) and how to get senior management sponsorship (Chase 2013).

These debates are recent ones and often come up in the context of how to set up the communication flows when the factories were not dedicated to one market. Multinational companies seem to be at various stages of specializing production and moving away from the concept of having a factory dedicated to producing for a single market, and having a market supplied by dedicated factories.

It started to become clear that there was a need for research in this area. Multinational companies are looking for guidance on how to build their S&OP governance structure.

Specifically, this refers to multinational companies that have their own internal production networks in a configuration that has factories servicing more than one market (Carter, Rogers and Choi 2015).

Some position the factories as autonomous units, receiving orders from the supply chain function as though they were contract manufacturers. This allows factory managers full control over their factories, but the supply function felt they had no control over the principal bottleneck in the supply chain which strongly impacted inventory and service (Olhager, Rudberg and Wikner 2001). Other companies position the factories as fully dependent production units, with an external supply chain function deeply engrained in the planning and dictating short term priorities to the factories. The supply chain function could exert authority over key drivers of inventory and service, but the factory manager felt helpless to pilot the economic performance of their factory and may not provide full visibility into factory capacities and agility (Houlihan 1988).

Similarly, some companies treat demand planning as purely a supply chain function, working alongside but independent of commercial and marketing teams. This allows the supply chain function to implement best practices and tools and feel a level of authority over this critical first step in the planning process. But other functions like commerce and marketing at times consider demand planning to someone else's issue, and refrain from fully engaging in the process and performance of the demand plan (Oliva and Watson 2011, James 2017). Other

companies have demand planning deeply embedded in the local commercial teams, which allowed for complete visibility of the market intelligence, but at times subject the demand plan to manipulation by non-supply chain actors who were not accountable for inventory or service performance (McCarthy Byrne, Moon and Mentzer 2011) .

S&OP seems to be caught in a dilemma in these multinational companies. How can the S&OP process be in close enough proximity to both the factories on one end and the markets on the other end? Proximity is needed to understand and influence the capacity and agility of the factories on one end, and the market intelligence like launches and promotions on the other. Both are needed to properly align supply and demand (Lee, Padmanabhan and Whang 2004). But too much influence on each end and the visibility and engagement of the actors breaks down and the end-end integration is lost as a consequence. Not enough influence on each end results in silos building up and the ability to drive alignment from end-to-end is lost (Bowersox and Morash 1989).

The dilemma is a direct result of the consequence of specializing production and having factories and marketing in a complex many-to-many relationship. The factories and the markets have either independent senior manager hierarchal authorities, or the common authority is too high to effectively encourage collaboration. When the relationship was one-to-one, these questions were quickly addressed by the fact that the country general manager was accountable for the overall performance.

This thesis addresses this question in a straightforward manner. A series of interviews were conducted with senior supply chain staff at major multinational companies. The objective of the interviews is to understand and chart the S&OP governances of their companies. The question is nuanced, because in most companies the S&OP governance is a shared authority, so pragmatic notions like dotted line and solid authorities are used to complete the mapping, as in matrix organizations (Shin and Shull 1978).

The mapping is interpreted by the development of an S&OP governance typology: a simple matrix that classifies the S&OP governance models into four easily recognizable types, with a focus on production planning and demand planning as proxies for S&OP authority over the upstream and downstream planning activities respectively.

The deliverable of an S&OP typology is valuable as a first benchmarking exercise, but does not help understand which typology is better. To answer this question, the approach is to focus on the concept of *alignment*. A successful S&OP process achieves alignment along two different axes (Tuomikangas and Kaipia 2014). The first axis of alignment is the *horizontal axis* from the demand plan through to the factories and the corresponding supply generated to meet this demand. The second axis is the *multi-functional axis* where alignment is sought between sales, marketing, finance and supply chain (Lapide 2014).

Each respondent provided insight to whether their company demonstrates non-alignment behaviours, such as willfully increasing demand plan to generate buffer inventory, or knowingly overproduce in the interest of a lower cost of goods. The S&OP types are contrasted as to their ability to inhibit these non-alignment behaviours.

One of the hallmarks of S&OP, as will be discussed (Lapide 2007), is the alignment of the demand plans and the forward financial plans of the firms: the idea that sales, marketing, finance and general management are so fully aligned around the demand plan that is the same, or very close to, the projected forward financial performance.

The implication of this notion of demand and financial alignment is that the general manager is now encouraged to fully engage in the demand planning process, as it is entwined with the financial planning process. However, this only underscores the importance of the multinational nature of the S&OP governance. The demand planning process is now directly influencing an accountability that is core to the role of the general manager, that of the financial commitment of the market. This raises the stakes even further for maintain local proximity in the demand planning portion of the S&OP process.

In considering questions of performance measures and their influence on behaviour, management governance and financial planning and budgeting, there is a clear overlap into the field of management control (Anthony 1965, Barrett and Fraser 1977).

To help understand this dynamic and further the conceptualization of S&OP, a framework from management control that describes the influence of accounting objects is deployed. Accounting influences the organizational life of the firm by both direct and subtle forces (Miller and Power 2013). The research explores how these accounting forces drive the observed S&OP process behaviours and how the different governance types succeed or fail to address them.

Finally, the influence of accounting objects on the S&OP process, along with the S&OP typology and performance, are used to develop a set of normative guidelines for the construction of the S&OP governance and financial alignment in multinational firms.

1.2 Thesis Construction

This thesis is constructed through 5 key sections:

The first, *Introduction*, begins with a personal testimony of how the back story of this thesis came to be and why it took the path that it did. From there, this section begins an examination of the state of Sales And Operations Planning (S&OP) literature and seeks to position it within the broader topic of supply chain integration. Seeking the antecedents of S&OP, the broader supply chain management literature is explored. All this leads into the research question that structures the thesis.

The second section details the *Research Design and Methodology*. Here the approach to the thesis and the constructs used for operationalizing S&OP governance and alignment are delineated. The methodology applied to the field research is articulated. And lastly the epistemological positioning serving as the foundation is laid out.

The third section is *Results & Analysis*. Here I present and explore the data obtained in the field research. A typology for S&OP governance is put forward and used to understand further the data. This typology is then applied to gain insight into the level of success observed in S&OP alignment.

Next is the fourth section, *Furthering S&OP Conceptualization*. Insights from management control are applied to deepen understanding of the S&OP concept, first with an exploration of some key management control constructs, then with the framework of Peter Miller and Michael Power (2013).

The following section is *Conclusions*. The research questions are revisited to demonstrate how they have been addressed and our rules for linking S&OP governance to alignment are put forward for consideration.

Lastly, a reflection on the findings of the research, the conclusions and limitations of the thesis yields avenues for *Further Research*.

A mapping that illustrates the structure of the thesis is provided in Figure 1.

Figure 1 - Thesis Structure



1.3 Literature Review

1.3.1 The State of S&OP Literature

S&OP is an acronym for Sales And Operations Planning. The name itself evokes the ideas at the heart of the term: the planning of commercial operations (sales, or demand) linked with the planning of the supply (production, or operations). From this starting point we can begin an examination of the state of S&OP by starting with the definition. Emergent as it is from practitioner literature, the APICS (The American Inventory and Production and Control Society, a non-profit dedicated to the definition and promotion of supply chain best practices) definition of S&OP is a useful starting point:

A process to develop tactical plans that provide management the ability to strategically direct its businesses to achieve competitive advantage on a continuous basis by integrating customer-focused marketing plans for new and existing products with the management of the supply chain. The process brings together all the plans for the business (sales, marketing, development, manufacturing, sourcing, and financial) into one integrated set of plans (APICS 2017).

Beyond APICS, S&OP has been defined in different ways. It has been described as supply chain planning that enables the *balancing* of supply activities with customer demand over

tactical and strategic horizons (Lapide 2005, Milliken 2008). Alternative definitions have placed emphasis on the integration of commercial and marketing activity into operational plans, and the coherence of operational demand plans with the overall business plan (Thomé, Scavarda, Fernandez and Scavarda 2011).

In all cases it is a *process* whereby the sales plans that drive commercial activity take into account the constraints and capabilities of the upstream supply chain (Kjellsdotter Ivert and Jonsson 2010, Hobby and Jaeger 2013). At the same time, those upstream production and activity plans are driven by commercial objectives. In this way, there is a balance between what is produced and what the firm's market requires (Reyman 2005). S&OP helps the firm to overcome territoriality, bias and conflicting agendas in finding this balance and alignment (Ross 2003, Reed 2012, Adamczak, Domański and Cyplik 2013). In other words, each function brings its own biases and motivations to the S&OP process, wherein the different actors have specific goals they would like to push the S&OP process towards, regardless of the stated objectives of the process. As we will see, since many of the consequences of these biases are felt in other managerial territories of the firm, restraining these reflexes is a challenge to the S&OP process.

S&OP is an emerging supply chain management process (Thomé, Scavarda, Fernandez and Scavarda 2012), with the deliverable being an integrated set of plans that drive the different functions of the business (Thomé, Scavarda, Fernandez and Scavarda 2012). The plans

referred to here span the entire scope of the business: sales plans, promotional plans, media spending plans, operational demand plans, production plans, sourcing plans for material supply and capital expenditure plans. The horizons go from several years out at the most strategic level to very tactical decisions in days and weeks.

It is most strongly associated with the supply chain, which is seen as the S&OP process and owner as well as the owner of the deliverables of the process (Affonso, Marcotte and Grabot 2008). These deliverables drive the decisions of what is procured and produced by factories, what is supplied to markets and what inventories are planned, all while considering constraints in operations (Feng, D'Amours and Beauregard 2010) and with commercial partners. As opposed to earlier frameworks of supply chain planning, S&OP emphasizes the collaboration and contributions of different functions (Mansfield 2012), as well as the sponsorship of senior management (Bower 2006, McLeod 2012, Chase 2013).

The current state of literature reveals that the largest contributions are from practitioners (Grimson and Pyke 2007, Tuomikangas and Kaipia 2014). These practitioner articles emphasize pragmatic preoccupations of steps for successful implementation (Lapide 2014), and obstacles to avoid in the journey to S&OP (Lapide 2007). They tend to emphasize multi-functional integration, and the pragmatic steps needed to obtain the adhesion and cooperation of the other functions to obtain alignment, such as meeting frequency, invitation rolls and templates for presenting data (Muzumdar and Fontanella 2006, Whisenant 2006,

Mellen, Allen and Prokopets 2010, Kelleher 2012). The frequent stress practitioners put on S&OP delivering 'one set of numbers' that align all multi-functional actors and unify sales, commercial and demand plans (Milliken 2008, Tate, Mollenkopf, Stank and Silva 2015) demonstrates this emphasis.

The 'one set of numbers' refers to the ambition of S&OP to have all concerned business functions (sales, finance, marketing and supply chain management) working and taking decisions with the same volumes, sales and profit objectives, business events, risks and constraints (Dougherty and Gray 2013).

S&OP concerns itself with information flow, treating the sales plans, financial plans and demand plans that drive the supply chain. Since the plans are meant to converge and be realistic, there is a two-way flow to the information: cascading of information along the supply chain, and the return flow of production and supply plans needed to confirm the feasibility of the overall planning. S&OP does not encompass material flow or the actual execution of the supply chain activities. If material flows and supply chain execution are addressed at all in the S&OP literature, it is along the lines of capacity management in order to have the S&OP process fully understand the bottlenecks (Olhager, Rudberg and Wikner 2001). The efficient management of that capacity is not included in the S&OP scope. Said differently, in order to function, S&OP must understand all current and projected capacity constraints in production, storage and transportation but it does not have as a goal to

minimize these constraints (Chen-Ritzo, Ervolina, Harrison and Gupta 2010). The S&OP process seeks to understand, capture and consider these constraints in the planning of the firm's activity (Barut, Faisst and Kanet 2002).

The objective of S&OP is alignment between all internal actors. The production plans should be aligned and balanced with the demand plans (Thome, Scarvarda, Fernandez and Scarvarda 2011). The demand plans should be aligned with the sales plans and commercial plans (Boyer 2009). This alignment is meant to ensure the overall mobilization of the supply chain towards the business goals of the company, as well as the feasibility of those goals.

The input alignment of all actors is meant to allow S&OP to be a strategic tool for senior management to understand the current direction of revenue and costs and to take decisions moving forward in the light of full information (Bower 2006, Wallace and Stahl 2008, Mello and Stahl 2011). For each problem identified in balancing supply and demand, different scenarios with cost trade-offs are presented for senior management to take informed decisions.

S&OP alignment must occur in two dimensions. Information flows within the company along the supply chain from the teams facing the customers to the teams facing the vendors, often with many steps in between including production planning, Distribution Requirements Planning (DRP) and Material Requirements Planning (MRP) (Lapide 2004-2005, Burrows

2007). The result is an integration that is 'end-to-end', at least internally to the firm, in that it links those collaborating with the customer and those interacting with suppliers. *This is the first axis of integration. The second axis of integration* is cross-functional: the coordination of activities between different cross-functional areas within the firm. The intracompany alignment of sales, marketing and finance efforts with those of supply chain management is at the heart of S&OP (Oliva and Watson 2011).

However, this idea of alignment as the key objective of S&OP clarifies that there are realities in today's supply chains that create true hurdles to true alignment along *both* of the axes mentioned earlier simultaneously. There is an alignment between supply and demand. This can be described as a '*horizontal*' alignment between upstream actors like factories that provide supply and downstream actors like business units that determine demand (Thomé, Scavarda, Fernandez and Scavarda 2012). The second alignment is between the different functions within the business units to align sales, financial and demand plans. This can be described as a downstream '*multi-functional*' alignment (Tuomikangas and Kaipia 2014). So in this way the alignment objectives of S&OP to achieve the 'one set of numbers' desired by practitioners encompasses the whole of the company's activity from production to market (*horizontal*), as well as amongst internal actors within the market (*multi-functional*). This horizontal and vertical way to see S&OP echoes early proposed definitions of supply chain management integration (Lambert, Cooper and Pagh 1998).

1.3.2 S&OP as a component of Supply Chain Integration

In order to be clear on state of conceptualization of S&OP, it is worthwhile to position the S&OP concept against the broad term Supply Chain Integration (SCI) as S&OP is still fairly new, the definition – at least among practitioners – the subject of some ambiguity, and lastly the differences between SCI and S&OP will help to understand the nature and role of S&OP.

There is no consensus in the literature on what constitutes SCI, with important differences in the constructs and scope (van der Vaart and van Donk 2008). The common elements that emerge are that SCI concerns itself with *flows* in the supply chain. These flows can be information flows, financial flows or physical flows (Prajogo and Olhager 2012). Most importantly for the discussion here, these flows are primarily with external actors to the firm: customers, vendors, logistics providers (Flynn, Huo and Zhao 2010). This definition encompasses all of the information exchanges of requirements, orders and data between firms. It also includes the physical movement and storage of goods, so material flows and physical execution of the supply chain are also often included in SCI (Nathalie Fabbe-Costes; Marianne Jahre 2008). The integration here occurs in physical transactions like shipping, receiving and documentation, but also in planning and commercial frameworks when considering the different degrees with which third party logistics providers can occupy key roles in a firm (Nathalie Fabbe-Costes; Marianne Jahre 2008). Additionally, critical

outsourced activities like distribution fulfillment centers require continuous integration of operational data.

Within this scope of flows, certain aspects are emphasized. Some consider SCI to include the processes by which these flows are managed between the firm and its external actors (Power 2005). Examining the processes of SCI between two external actors inevitably leads to addressing information technology (IT) as an enabler of SCI (Rai, Patnayakuni and Seth 2006). These processes include Vendor Managed Inventory (VMI) and relationship management. For IT enabling of SCI, the literature goes so far as to cite XML or web platforms as examples of SCI. (Power 2005). As with SCI, flows are at the heart of S&OP. However the flows covered by S&OP are only information flows: sales plans, demands, production plans, supply plans. There is no treatment of material flows in S&OP. The actual execution of these plans is considered beyond the reach of S&OP. It is in this way that S&OP is a subset of SCI. However, there is an element to these flows that is absent to SCI. One of the keys to S&OP is the balancing of supply and demand, in other words of operations and sales. We look to make and supply what we would like to sell, and we do not look to sell what we cannot make and supply. This requires information to flow two ways: from sales through operations, and then back along to sales again. This notion of two direction information flow is absent in the SCI literature. With this exposed, S&OP can be seen as a complementary subset of the integration flows of SCI.

A complete definition of SCI should go beyond what it *is*, and consider its *objective*. Here again a common theme emerges. The literature is consistent in its placement of supply chain efficiency as an objective of SCI (Flynn, Huo and Zhao 2010, Prajogo and Olhager 2012). The focus of SCI is squarely on connection and collaboration along the supply chain with external actors (Min, Roath, Daugherty, Genchev, Chen, Arndt and Richey 2005, Fawcett, McCarter, Fawcett, Webb and Magnan 2015), in the interests of efficiency, identifying bottlenecks and transparency of information. The goal of SCI is one of highest throughput at lowest per unit cost across the extended physical chain.

The objectives of SCI and S&OP appear to be different. SCI's goal is often cited as efficiency or effectiveness of the supply chain. This is different that the objective of S&OP, which is described as the balancing of supply and demand, or the matching of sales with production. The goal is seen as one of a supply chain driven by demand, while having financial and commercial targets that are achievable. Here there is a clear complementarity, as these two objectives are laudable and non-contradictory. S&OP seeks to be sure that operations is mobilized and deployed to answer expressed demands, and not over produce (and so generate wasteful inventory) or under produce (and so create service outages). In turn, the demand recognizes the constraints in operations, and that which cannot be fulfilled at an acceptable cost is recognized, removed from forward projections, including financial ones. This is a complement to SCI, which seeks to achieve the production and delivery targets in the

most efficient and optimized way possible, through integration with vendors and transporters, efficient use of resources, optimizing capacity and other means.

The extent and boundary of integration in S&OP is again different than that of SCI. SCI emphasizes the integration with external actors to the firm, the vendors, customers and providers. This intra-company integration and collaboration is notably absent in SCI, as pointed out by Flynn (Flynn, Huo and Zhao 2010). S&OP, as discussed here, is almost uniquely focused on cross-functional intra-organizational integration. This is not a contradiction or redundancy, but rather another way in which S&OP is filling the gaps of SCI.

SCI can be seen as the outer core of interactions and executions required to successfully and efficiently implement the plans derived by the S&OP process. S&OP will link the operational plans with the commercial and financial plans and ensure that the organizational plan is driven by demand. With those plans in place, SCI will allow efficient and clear communication with vendors, customers and providers. The orders, deliveries, IT integration, payments and other transactions and collaborative relationships enveloped in SCI occur even more smoothly when they are coherent with a well-run S&OP that has permitted the identification of sufficient resources to execute these steps.

In summary, SCI is a concept that involves the integration of the information and physical flows of the firm, its customers and vendors and providers through the use of processes, IT

and collaborative actions. Some consider a narrow cross-section of this, but the most complete definitions available include these multiple dimensions (Nathalie Fabbe-Costes 2008). An examination this definition with that of S&OP shows S&OP to be a complementary subset of SCI, a subset that fills some gaps in SCI without calling it into question as S&OP is narrower in its definition concerning *flows*, *extent* of integration and *objective*.

Table 1 recaps the distinctions between S&OP and SCI.

<i>S&OP in Comparison with SCI</i>			
		<i>S&OP</i>	<i>SCI</i>
1	Focus of Flow	Information only, in two directions	Information, financial or physical, often in one direction
2	Scope	Internal to one company	Between discrete supply chain actors, usually company to company
3	Dimensionality	2 dimensions: horizontal and multi-dimensional	horizontal dimension only
4	Objective	Alignment and balance	Supply chain efficiency

Table 1 – S&OP in Comparison with SCI

1.3.3 Tracing S&OP in the Supply Chain Management Literature

It's worthwhile at the outset of this thesis to take a broad view of the supply chain management literature and how it has evolved and grown. This will help set the context for where S&OP sits as compared to other aspects of supply chain management and where it may progress. The academic field of Supply Chain Management is vast, of course. It envelops

broad topics like sourcing, sustainability and manufacturing (with all that entails: quality, lean, automation, labour management, etc.) in addition to S&OP.

As this thesis is focused squarely on S&OP, and more specifically on S&OP in multi-factory international supply chains, this will be the lens through which the review will be done. This review lays out a definition of S&OP as a supply chain management process, with an objective of alignment and occurring along two axes. It must be clarified that the objective of this research is not to examine the process of S&OP, nor the tools used to execute the S&OP process, nor the KPIs used to measure the impacts of S&OP performance on the supply chain. This research will focus on the way in which the S&OP process is linked to the structure of the multi-national firm and the underlying financial territories and accountabilities that form the organization of the firm.

By looking at the evolving understanding of logistics through supply chain through to global networks, the antecedents of S&OP become visible.

Logistics and the Onset of Supply Chain Management

There was a time, before supply chain was a common term, when one spoke of 'logistics.' The label emerged from activities like physical supply and business logistics. Not even a field of study in its own right, it was often seen as a subset of marketing, and even then only when

transportation had large stakes (LaLonde 1977). As the field of logistics grew, there were some who saw the limitations in the narrow definitions of the scope and that a broader definition and study would be needed for multinational companies (Bowersox and Sterling 1982). Globalisation meant more than more imports and more exports, it also meant companies operating on a global scale. The internal networks of these companies would make manufacturing location decisions based on drivers like labor availability and costs, skills, sourcing variables and transportation costs. It was recognized that the implications of this were that better coordination, planning and costing models would be needed. That local markets would make decisions about production and inventory with their own needs in mind at the detriment of others was recognized as a risk (Bowersox and Sterling 1982). The themes that would become rising concerns in S&OP 25 years later had already begun to take shape (Lavastre, Carbone and Ageron 2016).

There was also an understanding developing that while logistics was a separate and distinct field from marketing, there was clearly an interdependence between the two functions (Bowersox and Morash 1989), one that would require coordination, and if the context were complex, then also collaboration (Kahn and Mentzer 1996). But if the marketing approach is to include the market response and the ability of the firm to answer the customer needs, then further research would be needed to explore how to accomplish this (Min and Mentzer 2000).

Supply Chain Management

In 1998 the Council of Logistics Management modified its definition of logistics to indicate that logistics is a subset of Supply Chain Management and that the two terms are not synonymous (Lambert, Cooper and Pagh 1998). This marked a discussion of the varying available and evolving definitions of supply chain management. The emergence of planning and information flows figured prominently in this debate and the differentiation of supply chain management from logistics in academia, which was seen as trailing practitioners (Lambert, Cooper and Pagh 1998). In other words, practitioners had begun separating the responsibilities of planning operations activities from the responsibilities of physical execution of transportation and distribution.

A representative definition came from the Global Supply Chain Forum that stated: “Supply Chain Management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and stakeholders”. (Lambert, Cooper and Pagh 1998) It is the inclusion of information flows and processes that signals an opening to supply chain planning. However, the framing was supply chain management as an activity of integrating different actors. Supply chain integration, as is argued here, is broader and envelops S&OP.

Mentzer et al attempted to find common elements in the varying definitions of supply chain management (Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia 2001). In addition to

continuing the expansion of the definition beyond material flows and logistics, they stress the importance of moving forward of the different functions in the firm in supply chains, such as marketing and sales, and this should be the focus of future research.

Standing out in the contributions to their definition is the work of Houlihan. Houlihan presaged the bullwhip effect by examining how longer, more complex chains were distorting demand (Houlihan 1988). In his definition of supply chain management, Houlihan recognized that global supply chains were creating separation of distance between production and marketing, and this came with real risks of distorted demand plans through information manipulation (Houlihan 1988). He correctly noted that upstream production then carried a higher risk of not trusting demand and plan production according to its own demand plans or considerations (Houlihan 1985), and most importantly for our work here, highlighted the increased risk of this dynamic when the production was not what he termed 'local-for-local'.

At around the same time, Cooper et al stressed that supply chain management was in fact comprised of business processes, wherein information flows figured prominently (Cooper, Lambert and Pagh 1997). They asked the question for future researchers of what supply chain management processes over what scope should be included. Elsewhere, Lambert argued that supply chain management included supply chain structures and process, but also management structures and processes, and that levels of integration need to be modulated

depending on the network structure, the type of linkage and the functions involved. (Lambert, Cooper and Pagh 1998).

There were attempts to take a more strategic view and to identify different schools of supply chain management thought, making a distinction between those, like Houlihan, who emphasized awareness of all actors from end to end and those, as just described, that emphasized processes (Bechtel and Jayaram 1997). Further research recognized that one of the real obstacles to successful supply chain management is the ability of firms to generate trust and align incentives within the firm (Fawcett, Magnan and McCarter 2008). Recognition was growing of the frustration of production management towards commercial behavior that would push sales at the end of quarters with detrimental economic impacts on manufacturing, for example. Other research showed that commercial teams were more likely to engage in and appreciate the demand planning process when they knew it was taken seriously by the rest of the chain and they understood the impacts of the demand plan (McCarthy Byrne, Moon and Mentzer 2011). This latter insight presages the testimony in the examination of S&OP in this thesis: The notion that demand planning, as a part of S&OP, is more successful when the participants believe that their management is engaged and that, as participants, they appreciate the role they play in the overall economic performance of the company.

Mentzer continued his efforts to define supply chain management in a survey of different practitioners in 2001 (Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia 2001). One of the notable developments that would presage S&OP was the finding that 90% of respondents found that finance was – at a minimum – influenced by supply chain management. Finance in this context is understood to be the internal financial management responsible for accounting and controlling. This influence would be deeply explored by S&OP in the coming years and this exploration is continued in this thesis.

With the introduction into the discourse of planning, information flows and business processes that go beyond purely logistics, one can see the roots of S&OP taking shape.

1.3.4 The Bullwhip Effect, a precursor to S&OP

A review of the antecedents to S&OP requires a thorough examination of the bullwhip effect. It was Lee who brought the bullwhip effect into the common dialogue (Lee, Padmanabhan and Whang 1997). Building on research from Forrester and – it can be argued - Houlilan, Lee laid out the phenomenon clearly. The bullwhip effect describes the distortions that occur to demand as the information flow moves up the supply chain. An illustrative example put forward by Lee was that of Procter and Gamble diapers. Small increases in demand, perhaps due to a localized commercial activity, generated increasing demand as it moved up the different links in the supply chain. When charted on a graph, the comparison of the ever

increasing demand as it resonates up the chain is unmistakably evocative of a bullwhip (Lee, Padmanabhan and Whang 1997). That the behavior is named for and is so easily explained by this imagery surely contributed to its successful diffusion (see Figure 2). The distortions served to greatly exaggerate the original small increase.

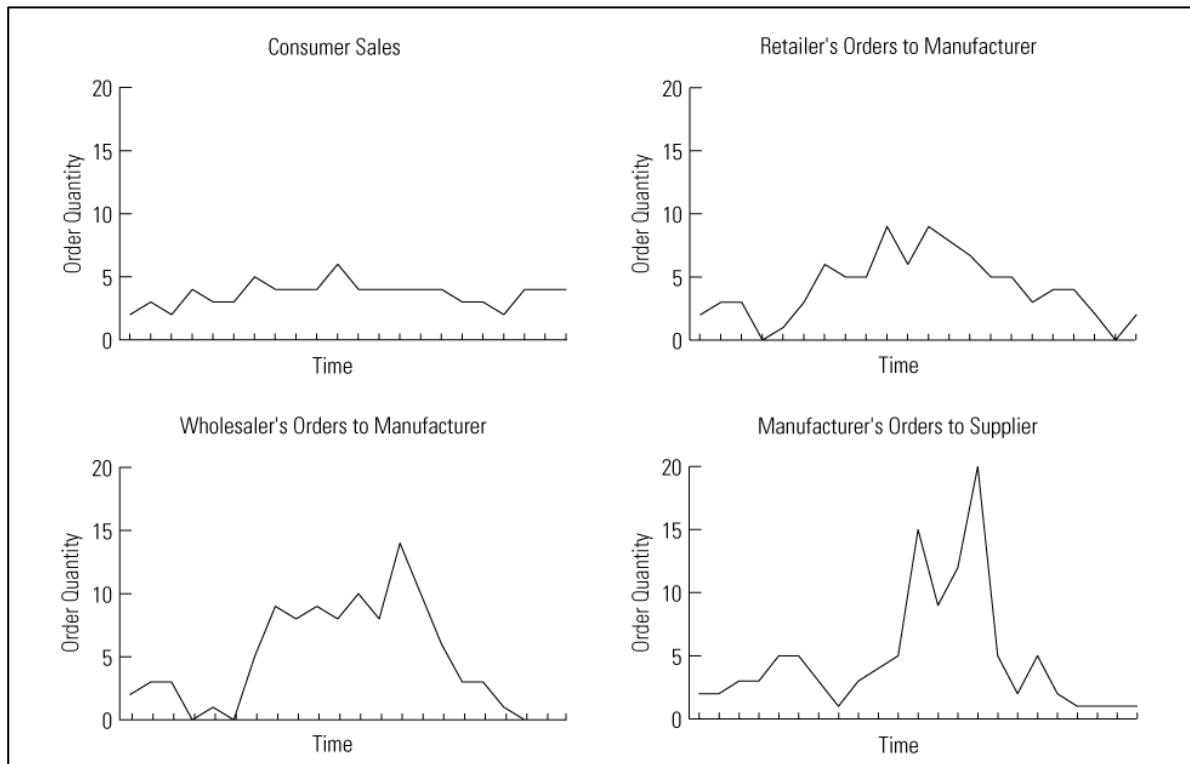


Figure 2 - The Bullwhip Effect On Supply Chains (Lee, Padmanabhan and Seungjin Whang 1997)

Lee argues that there are several undesirable impacts of this demand amplification (Lee, Padmanabhan and Whang 2004). From a purely cost perspective there are unplanned purchases of materials, less efficient use of capital production assets, more overtime and outsourced production. Also impacting costs are expedited transportation, in the form of less

efficient container utilization but also in switching to more expensive modes of transport in order to shorten lead times (Lee, Padmanabhan and Whang 2004). This is all before considering the consequential incidence on inventory levels and their associated costs in warehousing, working capital and depreciation.

The amplification effect that masks the true demand means that the incremental costs that are incurred are not generated to meet a true service emergency. They are to meet a demand that, after amplification up the chain, bears little resemblance to the true market need. For a plant manager squarely focused on and expected to explain production costs, it is an understandably great source of frustration to learn that the factory performance has been degraded not for a genuine unanticipated service issue - which would be frustrating on its own - but for a service issue that after the fact is understood to be non-existent. In this light, the bullwhip effect must be seen not just as a generator of waste, but a key vector through which confidence in the ability of the supply chain to plan is undermined. After one incident due to the bullwhip effect, the upstream supply chain actor will likely demonstrate healthy skepticism for the next rush requirements, which may be genuine. This, in turn, would generate frustration with downstream actors who expect a shared sense of urgency, not reticence.

This is an important point in the context of S&OP. The end-to-end horizontal alignment of the supply chain is precisely to have all actors focused in the same priorities and avoid imbalances

in supply and demand. A closer look at the sources of the bullwhip effect as identified by Lee will help illustrate how S&OP and its governance can contribute to managing and tamping down on the amplification of demand.

The first source of the bullwhip effect identified by Lee is demand signal processing (Lee, Padmanabhan and Whang 2004). Put simply, the ability of a company to recognize the true nature of the demand signal it is receiving downstream. Does it represent a true increase in demand or merely an internal strategic decision to increase inventory? This misconception can occur at a grand scale. As an example, at the depths of the great recession in 2009/2010, many manufacturing firms in the United States believed that consumer demand was rebounding, when in fact it was only the natural increase in inventory position to settle in at a lower target working stock after a drastic inventory reduction in the face of plummeting demand. This phenomenon is known as 'inventory bounce' (Krugman 2010).

Among the potential remedies Lee proposes is reducing the number of actors performing the forecasts in the supply chain. Lee cites Vendor Managed Inventory (VMI) and Collaborative Forecasting Planning and Replenishment (CPFR) as examples of vehicles towards accomplishing this (Lee and Whang 2000). The techniques require deep collaboration between manufacturer and retailer, for example. This collaboration obliges the support of sales, which are ultimately responsible for the commercial relationship with the customer, as seen from the manufacturer. In other words, not only does the planning process have to link

upstream and downstream planning to foster transparency and trust, it must be sufficiently close to sales in each market in order to gain adherence and support of sale to improve demand signal visibility.

The second cause of the bullwhip effect identified by Lee is what he terms the 'rationing game.' (Lee, Padmanabhan and Whang 2004) This is an accurate description of the behaviour demonstrated by supply chain actors when there is a shortage. When confronted with the fact that there will not be enough supply to meet all customer needs, the customer will inflate their requirements in order to gain a greater share of the rationing that inevitable occurs. I can testify from experience that this occurs between retailers and manufacturers, between subsidiaries and factories within multi-nodal supply chains and between factories and their material suppliers.

Lee proposes that one solution may be to create restrictions on the amount the demand can be amplified in different time horizons. This solution has potential for the link between manufacturers and their suppliers, which notably are the only examples cited. This solution is not very realistic if there is a power imbalance between the actors, for example between a manufacturer and a retail giant like Wal-Mart. Even if it can be envisaged, it would require strong and unwavering support from sales teams, with the same challenge of proximity mentioned above. Lee himself recognizes the limitations of his work, in that he sees the difficulty in obtaining adhesion of the retailer to this sort of information sharing (Lee and

Whang 2000), but stresses at the same time that this alignment is one of the three critical criteria for successful supply chains moving forward (Lee 2004).

The next cause of the bullwhip effect is order batching (Lee, Padmanabhan and Whang 2004). At each step in the chain, efficiencies are naturally sought to seek out optimal order multiples. This could be in transportation, where the optimization of container space is instrumental to managing costs. It is also true in manufacturing. Plant managers upstream, under pressure to control costs, will seek to make large production runs in order to better amortize the fixed set up costs. This has significant implications in the research here, as will be seen. The costs generated by the large production runs, in the form of increased working capital and inventory depreciation, are not felt by the factory manager in most companies. It is the supply chain management, responsible for planning, that is held to account. In order to have the transparency and ability to influence production runs, it could be argued that the supply chain management must have a certain authority and proximity upstream at each factory just as it is argued above they should have a similar presence downstream in each market.

Lee and others (Lee and Whang 2000, Stadtler 2005) recognize that technology is a key to helping control the causes of the bullwhip effect. The advent of advanced planning systems is critical to sharing and disseminating the complex information needed to ensure visibility. It is more than just forecasted demand, they point out. It is also inventory, orders, in transit status, order multiples and true sales information.

It should be noted that underlying Lee's work on the bullwhip effect is that he is applying it to multiple firms, a cascading series of *external* dyads in a linear chain. This is correct, of course. However, as we will see when looking at the dynamics of multi-nodal firms, it is just as applicable to the *internal* multi-nodal supply chains that existing within the complex international chains of these companies.

1.3.5 Supply Chain Networks and S&OP

The implications of Lee's bullwhip effect and the reflections of the business process and scope to include in SCM are further complicated by what can be described as the *multi-nodal* nature of today's supply chains (Carter, Rogers and Choi 2015). A dramatic increase in production specialization has transformed manufacturing footprints into regional or even global networks (Rudberg and Olhager 2003). Rudberg and Olhager refer to factories in the global footprint as *nodes* using the definition from Shi and Gregory (Shi and Gregory 1998). The result of this is that factories whose production was previously meant for domestic consumption is now being exported to multiple other markets. And these markets in turn are now supplied by imports from multiple foreign factories.

Researchers have examined the motivations and impacts of this phenomenon on the economic themes of labor costs, productivity and utilities (Meyer and Jacob 2008). Rudberg

and Olhager recognize that the impacts are not simply on manufacturing, but on supply chains as well (Rudberg and Olhager 2003). However their research explicitly limits the implications of the globalization of manufacturing networks to the logistics of supply chain management. That is to say, the efficient flow of storage and goods from origin to destination, in keeping with the common definition from literature (Larson, Poist and Halldorsson 2007) and from practitioners, for example from the Council of Supply Chain Management (CSCM).

Frameworks have been developed in the literature to address and propose strategies for manufacturing networks and the strategic roles of the factories, for example Ferdows' framework of 'rooted' or 'footloose' networks contingent on the unique or commoditized nature of the products and the production processes (Ferdows 2008) and further developed by Vereecke and Van Dierdonck (Vereecke and Van Dierdonck 2002).

Research along these lines addresses fundamental questions such as how many factories are needed, how to allocate production among factories, what is the strategic role of each factory and where the factories should be located (Vereecke and Van Dierdonck 2002). Yet even this research acknowledges that there are very few frameworks in the manufacturing strategy literature that address those very questions. Those who have attempted to explore the empirical validity of the frameworks highlight some difficulties in data collection. Among the issues cited are the difficulty in getting sufficient respondents to properly represent the true

nature of the activity at a given firm, and the insufficiently deep nature of the survey method to allow for enough firms to claim external validity (Spalanzani, Ageron and Zouaghi 2016). Others cite the problematic of generalizing findings across industries (Meixell and Gargeya 2005). Since some depth is required to capture the considerations and issues in global supply chain design, the quantity of data to capture a fuller range of industries becomes an obstacle.

These points are compelling and familiar, and indeed will be addressed further in the research methodology section to follow in this thesis.

In efforts to find frameworks for supply chain networks, it appears more common for researchers to focus on questions of where to locate factories in a network, rather than should there be a network (MacCarthy and Atthirawong 2003, Tate, Ellram, Schoenherr and Petersen 2014, Spalanzani, Ageron and Zouaghi 2016). This research does not take a focus on planning, as the presumption is that there is already a network that is or will be in place, and so the linear supply chain configuration is not in play.

Though this research is critical and insightful, currently supply chain management research has not addressed the impacts of manufacturing specialization on the planning processes of multinational firms, which is now commonly referred to as S&OP. As said well by Rudberg and Olhager, most manufacturing network researchers ignore the supply chain management

issues that are so important for the total effectiveness of a network organization (Rudberg and Olhager 2003).

Looking briefly outside the sphere of literature of supply chain and operations, some organization theory research recognizes that planning can act as a control and coordination mechanism in multinational corporations (Martinez and Jarillo 1989). Here planning is understood to be activities such as strategic planning, budgeting and production schedules. Put in this way, this is a natural invitation to pursue research into management control and planning as a key element of multi-nodal supply chains, an idea that will be developed further later in this thesis.

However, looking to the S&OP research, this issue is not addressed either. Both the academic and practitioner literature do not take into consideration this multi-nodal nature of today's supply chains, where the supply is provided by multiple factories serving multiple markets. They describe simple linear supply chains with a dyad of one factory and one market and the alignments they treat are understood as occurring within a unified governance body facilitating transparent exchange of information. In these linear supply chains there are none of the difficult choices of governance that companies are confronted with. One authority overseeing the supply chain from manufacturing to distribution is simple and manageable. However, most companies operating at an international scale today have business units in several markets and factories in several markets. The horizontal alignment must now occur in

a many-to-many arrangement, or said differently, in a multi-nodal configuration. The multi-functional alignment must occur in several business units in parallel. This arrangement is illustrated in Figure 3.

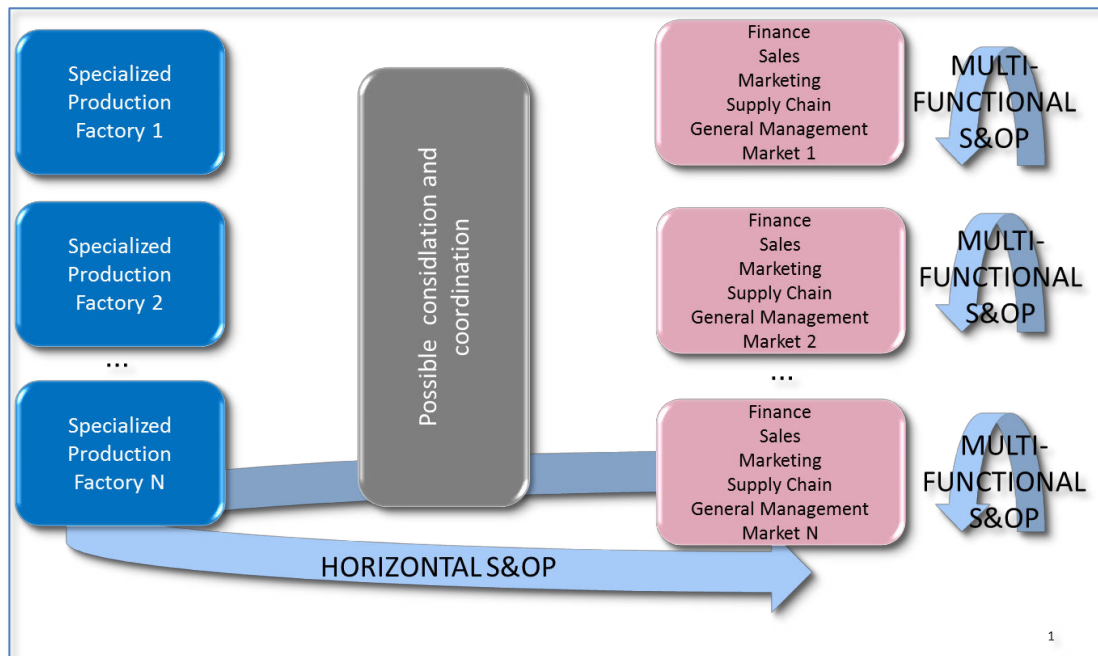


Figure 3 - Two Axes of S&OP Alignment In Multi-Nodal Supply Chains

Taking the discussed elements together, the conceptual positioning and theoretical framework of this thesis can be visualized, as seen in Figure 4. The focus is on S&OP and critical complementary phenomena like the Bullwhip Effect. However, it will be seen later in this thesis that this initial framework must be expanded outside the sphere of supply chain management entirely and into the sphere of management control.

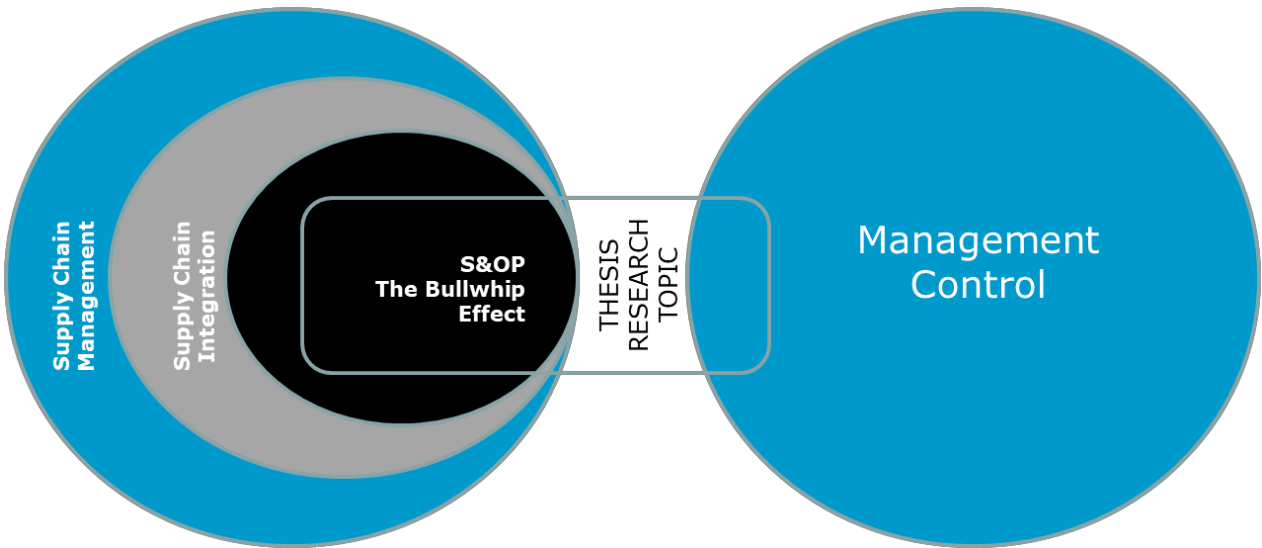


Figure 4 - Conceptual and Theoretical Framework

1.3.6 S&OP Governance and Matrix Organizations

In this research, as well in all correspondence, exchange and dialogue with respondents, the notion of S&OP governance is used and referred to. Governance here does not refer to the structure of the board nor of the internal and external control mechanisms in place to ensure the proper respect of legal and social responsibility and the control of risks.

Here, governance is used as it is the term best understood by the practitioners in question to describe the hierarchal structures in place to identify and manage the S&OP process. It is the managerial governance, so to speak. It is the answer to the question, '*to whom does the S&OP team consider itself reporting to in the company.*'

As will be seen, the answer to this is often complex, with multiple reporting lines for S&OP planners. This complexity is compounded by the prevalence of different terms used in different companies to describe the same thing.

Considerations of multiple reporting lines is rooted in the concept of matrix organizations (Shin and Shull 1978). Matrix organizations have their roots in the aerospace industry, and were initially focused more on project management hierarchal structures layered with operational project structures (Galbraith 1971, Shin and Shull 1978, Kuprenas 2003).

A precise definition of the matrix structure has proved elusive, precisely because there is a spectrum of organizational rules and behaviours from a simple to a matrix structure and it is difficult to find demarcation points (Kolodny 1979, Ford and Randolph 1992). In fact, there is a school of thought that considers that matrix organizations, such as they are, only exist as transitions from one form of organizational configuration to another within a company as they respond to environmental pressures (Kolodny 1979). This view in part evolves from the roots of matrix organizations being temporary in nature due to their first applications to manage exceptional one-time temporary projects rather than as a permanent structure (Ford and Randolph 1992).

The literature for matrix organizations relies heavily on anecdotes and practitioner contributions. In practice, matrix organizations are heavily dependent of however a company

and researcher chooses to define them (Ford and Randolph 1992). Ford and Randolph offer what appears to be the most complete definition: ‘any organization that employs a multiple command system that includes not only a multiple command structure but also related support mechanisms and an associated organizational culture and behaviour pattern’ (Ford and Randolph 1992).

In any case, matrix organizations are marked by hierarchal authority from at least two of three organizational *forms*: function, product and area (Kolodny 1979) and perhaps even more, such as customer or process (Galbraith 1971). One way to see how this definition fits into the question of S&OP governance is to consider how planning a product from end-to-end means crossing over multiple organizational areas – as is the case in multi-nodal supply chains. And if this is indeed the case, do companies layer a matrix organization to manage this? A further consideration is how the matrix organization is structured when all three organization forms are needed, as S&OP in the multi-functional axes requires other functions such as finance, marketing and sales.

Matrix organizations are seen as bringing standardization and expertise to a specific function while at the same time allowing that function to serve in a multi-functional operational team (Numerof and Abrams 2002). That description fits S&OP well. If we look to the multi-functional alignment objective of S&OP, the S&OP planner must serve as part of a team with finance, marketing and sales. Similarly, upstream the S&OP planners must work with

production specialists to understand manufacturing resource capabilities in order to balance supply and demand in the horizontal alignment.

That is not to say that there are no downsides associated with matrix organizations. Some have cited as weakness to the multiple reporting lines approach: lack of clear expectations among employees, inability of management to resolve power struggles and misaligned accountability and rewards (Numerof and Abrams 2002).

These weaknesses help explain why some practitioners find it difficult to explain clearly and transparently their reporting structures. They might not be entirely clear on the structures themselves, and the subject is fraught with political ambiguities (Numerof and Abrams 2002).

To help with these issues – or perhaps exacerbate them – the idea of solid and dotted lines has become a common part of the everyday vocabulary (Numerof and Abrams 2002) and is referred to frequently in this research. The solid line is understood to the ‘line manager’ or operational manager directing every-day, ongoing concerns. The ‘dotted line manager’ or functional manager focuses on the process, tools and techniques associated with the functional expertise of the employee. In the case of S&OP, this may be the techniques of demand planning baseline calculations, the rules for performance measure determination, the frequency and attendance of planning meetings, just to name a few examples.

A helpful way to imagine solid and dotted lines as part of the organization forms that support matrix structures is to image the solid line manager being more focused on activities and tasks linked to the product or area organization forms, to use the terms suggested by Kolodny (1979). That is to say the goals linked to the product (physical or service offering) over a fixed area, such a market. The dotted line is more functional, and linked to the way and manner in which the function is carried out in the service of the operational goals. The power and authority of the solid and dotted lines are on a continuum, one that is different for each company (Ford and Randolph 1992).

This line of thinking can be taken further, into the sphere of control mechanisms for multinational corporations (MNCs). Be they regional or global, multi-nodal supply chains are by definition MNCs. There is extensive literature on how MNCs achieve geographical coordination across subsidiaries. The control mechanisms are broadly divided into two types: 'structural' or formal mechanisms being one, and 'subtle' or 'informal' being the second (Martinez and Jarillo 1989). The contribution to the research here is that planning, budgeting and scheduling are included in the 'structural' coordination mechanisms. Organization studies appear to have already recognized that planning activities play a formal role in the ability of MNCs to integrate and coordinate across geographies (March and Simon 1958).

It is with this understanding of matrix organizations for describing and applying the term 'S&OP governance' that the research was undertaken. This approach proved to be

appropriate for this research, as participating practitioners needed little or no prompting to engage in using terms like 'governance' and 'solid' or 'dotted' reporting lines, and as will be seen, S&OP does indeed appear to offer a contribution as a controlling mechanism for multi-nodal supply chains.

1.3.7 Placing S&OP in the Context of the Firm

Bringing this review of S&OP to a close, we have seen how S&OP is an internal process focused on two-way information flows that strives to achieve alignment. The antecedents of S&OP point to how S&OP requires collaboration with actors in an alignment along a multi-functional axis to ensure that all commercial actors are in agreement on the demand, and alignment from end-to-end in order to balance the supply with the demand and achieve a horizontal alignment.

When considered in the context of multi-nodal supply chains, the problematic begins to emerge that there are several markets seeking demand alignment in parallel, and multiple factories driving the supply along the horizontal dimension. Matrix organizations that bring together dimensions of product, geography and function are one way to address the organization challenges of these multi-nodal supply chains.

A critical element to add to this context is how the S&OP governance interacts with the financial governance of the firm. The financial governance is critical to the understanding of the S&OP governance for several reasons. Financial governance here imagines the way in which the firm has defined territories or boundaries within which to measure financial performance. The financial performance is understood to be top-line revenue and bottom line profit, as captured by the Profit & Loss Statement (P&L) as well as the balance sheet that captures assets and liabilities. It is not material for S&OP whether these financial boundaries represent actual legal entities within the broader company. What is critical is that, internal to the company, the financial governance is comprised of these management entities. It's possible or even likely that the firm has overlapping P&Ls, one that represent geography while others represent products. The factories may even be carved out as their own P&Ls.

Secondly, the multi-functional alignment – the 'one set of numbers' – in addition to the demand plan has, as one of its elements, the financial plan, be it a budget or a re-actualized trend. The responsibility to define and achieve the financial objectives of the business unit is among the foremost responsibilities of a general manager. It is common to hear of general managers using P&L ownership as a definition of their rank and title. The notion of financial objectives includes top line revenue and bottom line profit as expressed with the P&L. With the notion of multi-functional alignment, the P&L ownership becomes linked to the previously defined objective of S&OP alignment. This creates a strong link from the S&OP to

the financial plan to the general manager. And as there are multiple P&Ls, there are multiple general managers concerned by multi-functional alignment responsible for multiple markets.

Thirdly, when challenged on their lack of collaboration or transparency, the actors in the S&OP process often provided rationales that are rooted in the optimization of the financial performance of their scope of responsibility. This scope is often expressed explicitly or implicitly as a P&L. The experience that informs the research design is one where behaviours in the S&OP process are often driven by a desire to knowingly or unknowingly act in favour of a local financial performance at the detriment of the overall financial or commercial success of the company.

Therefore, this research seeks in part an exploration of the supply chain governance that oversees the S&OP process as it stands in comparison and in interaction with the financial governance of the firm. It is with this in mind that the research question that follow were defined.

1.4 *The Research Question*

This work aims to describe and foster further understanding of the impacts of complex multi-nodal supply chains on S&OP governance and both alignment objectives. In a multi-nodal supply chain management there are several dimensions of governance in action. The firm may have several markets where marketing and sales occur, implying alignment in each market of sales, financial and demand plans. These markets are usually delineated by general managers considered accountable for the profit and loss over their managerial scope.

These markets may be served by several factories, implying several alignments of supply and demand with an operations organization governing manufacturing. On the manufacturing side the factories are usually run by factory managers held accountable for the financial performance of their factory. The parallel S&OP alignments existing in academic and practitioner literature, should they exist in the firm, forcibly occur in different organizational teams as the multiplicity of factories and markets, with a multitude of financial territories, render a single governing organization impracticable.

This leads to the question of how do firms with multi-nodal supply chains establish supply chain governance to achieve S&OP alignment in the multi-nodal context? Do these firms recognize difficulties in establishing both alignments in parallel? In particular, do multi-nodal

firms observe behaviours that illustrate non-alignment between the supply and the demand, or demand that is not an attempt to reflect the expected financial performance of the firm?

With insight into these questions, a theoretical framework can be developed to help move the conceptualization of S&OP.

A successful S&OP in multi-nodal supply chain management leads to greater transparency and alignment of the supply, demand and financial planning of the firm. The objective of this research is to contribute by analyzing the observed S&OP organization, governances and associated alignments and use this to begin the construction of a framework that furthers the conceptualization of S&OP by recognizing and incorporating the impacts of multi-nodal supply chains on S&OP.

It must be emphasized that the focus of study in this thesis is on S&OP organization and governance. This thesis does not delve into questions such as S&OP methods. Here methods includes, for example, demand planning statistical models, KPI calculation and usage, production capacity leveling, cost of inventory versus cost of potential service disruptions, production batch size versus fixed cost savings and so on. This is not to say that these areas of S&OP are not important, but rather they are not the focus here.

Contributions of the Research

It's hoped that this research offers contributions in different dimensions.

The first contribution is that of *empirical contribution*. As will be seen, one of the prominent features of this thesis is the unique access to senior supply chain personnel of major global firms. The operational credibility of the interviewers permitted a relaxed, transparent exchange. For practitioners, this offers a rare, unvarnished view into the perceptions their cohort face in managing their S&OP process. This is even more critical in a field such as S&OP, a field in which, as the literature review discusses, there is clear room to grow in conceptualization.

The respondents span several industries, some with corporate positions, and others with operational ones. This empiric field data is rich, and it may be fertile ground for further treatment beyond that of the scope of this PhD.

Along these lines, there is a *managerial contribution* as well. One motivation for the openness exhibited by the respondents was the knowledge that they are experiencing challenges in successfully implementing their S&OP, and sense that there are good practices that could help. These practices could either be existing and unknown to them, or that perhaps collaborating on research such as this they can contribute to the genesis of improved practices.

A notable dynamic since the research has been completed is that many respondents have expressed curiosity as to the conclusions of the research, and some have even extended invitation to present the results formally at their companies. The conclusions in this thesis recognize this desire by practitioners for tangible contributions. There are normative rules offered for consideration by managers on adapting their S&OP governance to their context and considerations to bear in mind when trying to achieve alignment.

Lastly, the research question asks for a *conceptual contribution* in the form of theoretical framework with which to further our understanding of the S&OP concept. This research indeed offers new insight in to understanding and furthering the concept of S&OP looking at it through the lens of Management Control, in particular to the influence of accounting objects such as P&Ls, financial projections and budgets.

Taken together, these 3 contributions – empirical, managerial and conceptual – position this PhD as offering an interest to practitioners striving to improve their performance, researchers looking to continue the evolution of supply chain management concepts and as a source of data for developing and confronting further research.

2. RESEARCH DESIGN AND METHODOLOGY

This section will address the design and methodology of the research performed to answer the research question.

Here the reader will find a detailed description of the constructs used to operationalize S&OP governance and S&OP alignment. Following that, the methodology employed to explore these constructs is explained. The terrain for the research is laid out in detail, detailing the number of companies interviewed and the data collection methods used.

Lastly, the epistemological approach to this research is discussed, exploring the positioning of the research and the posture with which it was designed.

2.1 *PhD Approach: Roadmap To Address The Research Question*

A brief summary of the research design that will be described in detail further:

Finding the Research Terrain

The field data was collected using a survey interview method targeting major firms with multi-national footprints. One hour interviews were conducted and recorded with senior supply chain management personnel at these firms, either in person or by phone. Over 30

companies were interviewed in the course of the research, with several different industry sectors and geographies. The objective was to map each company's S&OP governance in such a way as to compare and classify them.

Key Research Constructs

In order to structure the research, a number of constructs had to be put into place. Firstly, the pragmatic construct of solid and dotted line hierarchal reporting was used as a way to operationalize the governance of S&OP, as most firms have dual reporting structures.

Secondly, the scope of S&OP and key activities had to be defined in order to be clear about what activities fell under whose responsibility. This step was critical to being able to eventually try to identify different governance approaches, and necessary to do before the interviews in order to be sure to cover a broad scope in so short a time.

Lastly, constructs were needed to identify which company S&OP's were successful or not in achieving alignment. As will be discussed, this is a sensitive consideration that could easily lead to polemics with practitioners, particularly with this research in that it spans many different industries.

Data Treatment

The empirical data was transcribed and analyzed in order to classify the S&OP governance structures of leading multinational companies possessing multi-nodal supply chains into a typology. The S&OP governance types observed were then contrasted with their degree of success in achieving the two axes of S&OP alignment.

Linking S&OP to Management Control

The typology of S&OP governance types, along with their corresponding level of success in achieving S&OP alignment, was then used to develop a link to a key framework in Management Control proposed by Miller and Power (Miller and Power 2013). Miller and Power position accounting objects such as P&Ls, financial projections and budgets as a powerful organizing force in the life of firms helps explain and bring insight to the challenges of S&OP alignment. This insight may provide orientations for firms looking to improve their S&OP outcomes and performance.

2.2 Operationalization of Supply Chain Governance

The hierarchy structure companies implement to permit the supply chain management to span the upstream and downstream ends of multi-nodal supply chains is crucial to describing how companies attempt to achieve S&OP alignment. Achieving horizontal alignment in multi-nodal supply chain management requires *at least* coordination and *at most* control over S&OP activities occurring in several markets and in several factories. The habitual performance measures of S&OP for inventory, service and cost trade-offs are dictated by constraints and decisions occurring at the opposite ends of the S&OP horizontal dimension. Companies have taken different approaches to deal with the competing management dimensions.

Taking service as an example, there are many reasons why a service issue may arise and the reasons can appear at any point in the company. Poor service might be due to poor demand plans, poor production planning, quality issues or material supply issues at a vendor. These typical supply chain causes are across the horizontal dimension. Looking at the multi-functional dimension, service issues may arise because of an uncommunicated pricing change or promotional plan or lack of coordination of media plans with new product planning. Each company has their own internal suite of performance measures, with their associated accountabilities, to try to capture all the questions around what are the root causes and drivers of service performance.

The potential governance configurations include multiple reporting lines to different authorities. To accommodate this possibility the research design includes the notion of *solid* and *dotted* line reporting authority. The solid line reporting authority is described as being the principal accountable authority providing day-to-day direction, prioritization and counsel. All tactical decisions to resolve issues and drive performance are under the solid line authority. This solid line reporting authority is also the primary source of determining performance evaluations to the employee.

The dotted line authority is described as a secondary provider of orientation and priorities. The focus here is on accountability for process standards and techniques, strategic orientations and a lesser determination of performance evaluation. The definitions of solid and dotted line authority must purposely be left approximate in this research so as to allow each company to comfortably answer what is often a sensitive human resources question in the spirit of shared authority structures without causing confusion through strict definitions.

These two constructs of solid and dotted line reporting authority are then applied to map the S&OP governance. As described earlier, the S&OP governance spans activities in the two axes of alignment. The definition of the S&OP tasks to map onto governance is a delicate task. Each company is structured differently, with different terms and priorities. Care must be taken to include only tasks expected to be present and understood by all and at the same

time sufficiently granular to appreciate the S&OP governance structure in place. The tasks were developed from author experience, as well as the work of previous researchers (Thome, Scarvarda, Fernandez and Scarvarda 2011, Hulthén, Näslund and Norrman 2016).

Looking upstream, the key S&OP activities in manufacturing can be divided into 3 generalized tasks: Production Planning, Material Supply and Production Scheduling.

Production Planning is used to describe the task of defining the volumes and products the factory intends and commits to produce, as well as the identification of capacity requirements over a tactical horizon, usually 12-18 months. This production plan will require raw material inputs from vendors, an activity termed *Material Supply*. The final upstream activity considered is *Production Scheduling*, the short term decisions concerning sequencing of products, set ups and line utilization. There are several possible governance configurations for the upstream S&OP activities available to companies. These activities may occur within each factory uniquely under the direct authority of a factory manager or may occur under the dotted line authority of a centralized supply chain management team. It is possible that some or all of these activities occur centrally without any authority of the factory manager in whose site the execution is occurring.

Turning to downstream, there are four activities used to describe the S&OP process: Forecast Process, Baseline Forecast, Launch Forecast and Promotions Forecast.

The first is *Forecast Process*. This activity involves the coordination of the multi-functional actors to bring together different views, market intelligence and financial targets. This information is usually exchanged and debated in S&OP meetings, the coordination of which would come under this activity. The other three S&OP activities are the construction of the demand plans. They are *Baseline Forecast*, *Launch Forecast* and *Promotions Forecast*. These three activities are not forcibly separate and distinct, but they may be and the intention was to capture the distinction should it exist.

Connecting the two ends of the horizontal alignment are two steps, the International S&OP and the Supply Planning. The International S&OP is comprised of three activities. The *Demand Consolidation* step is the consolidation of the demand plans into one inclusive view of the demand for the territory comprising the markets. *Arbitration* is the activity of allocating resources in the event of a constraint or scarcity. The resources could be inventory, production capacity, manpower or materials used in production. *International Stock Level* is used to capture the responsibility for inventory produced but not yet been transferred physically or through accountability to a downstream link in the supply chain.

Supply Planning is intended to capture the decisions regarding the parameters and deployment of stock to downstream markets. As with the other steps in the S&OP process this may occur centrally or within each downstream market. Supply Planning is comprised of

three activities or areas of responsibility. The first is *Supply Requirements*. This activity includes the definition of supply parameters such as lead time, rounding values and safety stocks and their application to determining supply requirements for downstream markets. The other two activities are *Service Level* and *Market Stock Level*. Perhaps more accurately described as areas of responsibility, these two steps are intended to capture the responsibility for the inventory level in downstream markets and the service level the company provides to its external customers.

The total of activities to map the S&OP process for multi-nodal supply chains is then 13 steps spanning both the horizontal alignment process and multi-functional alignment process. These classical upstream and downstream management dimensions used for the S&OP activity mapping is shown in Table 2.

Table 2 - Core S&OP Functions For Governance Mapping

Core S&OP Functions		
Manufacturing Supply Chain	Production Scheduling	The short term decisions concerning sequencing of products, set ups and line utilization
	Material Supply	Raw material and component input supply for production
	Production Planning	Defining the volumes and products the factory intends and commits to produce, as well as the identification of capacity requirements over a tactical horizon, usually 12-18 months.
International S&OP	Demand Consolidation	The consolidation of the demand plans into one inclusive view of the demand for the territory comprising the markets
	Arbitration	The activity of allocating resources in the event of a constraint or scarcity. The resources could be inventory, production capacity, manpower or materials used in production
	International Stock Level	The responsibility for inventory produced but not yet been transferred physically or through accountability to a downstream link the supply chain
Supply Planning	Market Supply Requirement	Includes the definition of supply parameters such as lead time, rounding values and safety stocks and their application to determining supply requirements for downstream markets
	Market Stock Level	Inventory level in downstream markets
	Service Level	The service level the company provides to its external customers
Demand Planning	Baseline Forecast	The elaboration of the demand plan for baseline products without commercial or media stimulation
	Launch Forecast	The elaboration of the demand plan for new product introductions
	Promo Forecast	The elaboration of the demand plan for promotional products or baseline products subject to promotional stimulation
	Forecast Process	Involves the coordination of the multi-functional actors to bring together different views, market intelligence and financial targets

2.3 Operationalization of S&OP Alignment

The first challenge to designing research into S&OP alignment is to identify measures to operationalize this S&OP alignment. The definition and identification of S&OP alignment is critical and there are two dimensions of alignment to measure, the horizontal and multi-functional axes. There is no universal quantified, normalized measure available to capture this alignment and what constitutes a mature and complete S&OP process (Thome, Scarvarda, Fernandez and Scarvarda 2011). Every company has different internal measures for the success of the S&OP process.

For multi-functional alignment, measures of forecast accuracy or bias quantify how accurate the demand plan was, but only if all actors were aligned around 'one set of numbers'. A strong indicator of horizontal alignment would be minimal inventory buildup due to unbalanced supply and demand. To capture that in a quantifiable way would involve asking participating companies to identify that inventory imbalance and share it in a comparable way. These approaches would create complexity and effort for potential participants that would generate serious risk for a successful research outcome.

The risks are several: The first is that most companies would be unwilling to share the raw data necessary to retool their calculations into a homogenous data set. Since one of the key elements is the monetization and alignment of demand plans with financial plans it is a big ask to expect participating companies to share information that is naturally seen as

confidential. This would have put the whole research enterprise in jeopardy. Following that is the risk that all energy and effort will be expended in normalizing the diverse measures. This energy and effort, rather than bringing credibility to the measure of SOP alignment, might actually undermine the result.

Many practitioners, seeing only their company and comfortable in their own measures, could well question – if not dismiss – the pertinence of the research to their own contexts under the guise of a conviction that a normalized measure of S&OP alignment success was not relevant for their firm. For example, inventory might be a more important consideration for a low margin consumer goods company than a high margin pharmaceutical company.

For these reasons a more behavioral approach was used to identify the success or failure of alignment. The operationalization of the abstract objective of alignment is the first challenge that the research design had to address. In practice, alignment is not possible if there is a willful intent on the part of operational actors to distort or skew information and reduce transparency. These distortions ensure that the supply chain is not aligned as it demonstrates a willingness to drive decisions in the supply chain that otherwise would not have been taken. It is critical to note that while the presences of intentional distortions are a clear indication of the absence of alignment, the opposite is not true. An effort to provide and share clear transparent information in the two dimensions of the supply chain is not an

indicator of the presence of alignment, but it is a presence of the good will and transparency of all actors towards a successful S&OP process.

Though the biases demonstrated by a lack of alignment are behavioral, they do not fall on the spectrum of decision-making biases identified by Carter, Kauffman and Michel (Carter, Kaufmann and Michel 2007) in their effort to link the biases of decision-making science to supply chain management. Carter et al have developed a taxonomy of 9 potential biases in decision-making that could influence decisions in supply chain management that put emphasis on the errors in judgement made by managers under conditions of bounded rationality.

In this instance, the actors believe they are acting rationally and are indeed actively behaving in non-transparent and non-collaborative ways and are willfully biasing information and data towards what they perceive is their self-interest and the interest of the firm. Said differently, the actors are not under the mistaken belief that they have made correct decisions, they are knowingly sending erroneous data under the mistaken belief that this behavior is correct.

Though the risk of the biases described by Carter et al may exist in the forecasting process, as it is vulnerable to these forces just as any other human analytical activity (Oliva and Watson 2012).

With this notion of intent and collaboration in mind, in order to capture misalignment in the horizontal dimension the notion of *willful supply/demand imbalance* was used. This misalignment occurs when the upstream factories intentionally supply products that are not required per the demand signals provided. In other words, a misalignment between supply and demand was knowingly created. Examples of this are a factory producing in order to cover fixed costs and not to respond to expressed demand. Factory managers are often more strongly incentivized for their site's economic performance than for inventory generated and housed downstream. Along these lines, a factory may increase the batch size to levels incompatible with the expressed demand in order to improve manufacturing costs, or anticipate production to an exaggerated degree to prevent equipment setup costs.

Turning to the achievement of downstream alignment, a similar approach was used. Here the notion of *willful demand manipulation* was used. As the start of the operational S&OP process, the demand plan is the expression of the result of the multi-functional alignment of S&OP. It cannot be the result of alignment if there has been an intentional effort on the part of operational actors to alter the demand plan. The most common example of this willful demand manipulation is to overstate the planned demand in order to generate inventory the supply chain would not otherwise plan to provide. This is done in an effort to ensure service continuity when there is a lack of confidence in the ability of the supply chain to meet the demand. Early work into the bullwhip effect recognized this sort of behavior (Houlihan 1988). Experience has shown that if sales personnel are responsible for the demand plan, a willful

manipulation may occur in the opposite direction, which is to say to lower the demand plan to manage the expectations of the sales targets they are evaluated with.

These two constructs serve to identify misalignment along the two axes of S&OP. Examples to illustrate these misalignments are listed in Table 3.

Examples of Misalignment	
Upstream - Willful Supply/Demand Imbalance	overly large production batches to reduce production fixed costs at the risk of reactivity and inventory
	producing to occupy assets and improve capital amortization
	producing to absorb plant fixed costs independent of demand
	refusing to use overtime or more expensive secondary or outsourced assets to alleviate capacity concerns
	refusing buffer stocks of material to improve reactivity
	improving cost of goods through high material purchases in disregard for obsolescence costs
	Understating capacity to avoid risk of unfulfilled supply plans
	Understating reactivity to avoid risk of unfulfilled supply plans
Downstream - Demand Plan Manipulation	Inflating demand to increase buffer stocks
	Deflating demand to decrease overall inventory
	Inflating demand to claim greater share of constrained resources
	Lack of effort to anticipate promotional programs
	Withholding market intelligence information
	Lack of participation in demand planning process

Table 3 – Examples of Misalignment

A third operationalization is needed to capture the ability of the company to align the demand plan with the overall financial planning activities of the firm. This can be measured in a straightforward way by asking the binary question of whether the company actively compares and aligns the demand plan with the financial plan as a matter of policy and active practice.

The advantage to using this approach is in its universality. This operationalization through intentional distortions may be present in different industries and permits the avoidance of inconsistent or burdensome quantifiable measures a specific company may or may not have to capture misalignment. Since alignment is at the heart of the concept of S&OP, we are able to observe in the most fundamental way the success or failure of the firm in achieving the key objective of S&OP in either dimension. These intentional distortions work against transparency and undermine confidence in the S&OP process. The result is that S&OP cannot achieve its principal alignment objective and trust between the supply chain actors, making this operationalization a valid measure of S&OP alignment.

The operationalized measures, their associated S&OP alignment element and key illustrations are described in Table 4.

Definition of Indicators of S&OP Misalignment

<i>Willful Demand/Supply Imbalance</i>	The intentional act of producing in excess of the requirements called for in the demand plan, usually motivated by economic considerations upstream in manufacturing.
<i>Willful Demand Plan Manipulation</i>	The intentional act of altering or misrepresenting the demand plan to upstream actors for the purposes of generating inventory or masking performance expectations in sales or profit.
<i>Demand Plan/Financial Plan Alignment</i>	The presence of a stated policy of alignment between a monetized demand plan and the latest agreed upon company financial performance plan or budget.

Table 4 - Alignment Indicators

2.4 *Research Methodology*

The research design called for a method that allowed respondents to share information that would be difficult to expose and obtain. The supply chain governance questions may put the respondent in the position of describing lines of authority that are often understood by convention but not officially recognized. Similarly, many respondents might hesitate to answer transparently questions that put their company and S&OP process in a negative light. The operationalized constructs of willful supply/demand imbalance and willful demand manipulation are clearly potentially uncomfortable questions for many supply chain management professionals as they speak directly to a failure of the primary objective of a core process. They are also questions that require a careful approach, one that leads into the question at the most appropriate moment to obtain a truthful response. This requires the construction of a sense of trust and confidence between the interviewer and respondent. To build this relationship the interviewer must establish credibility in order to foster the needed level of mutual respect.

These considerations, coupled with the research objective to describe the governance of S&OP and ability to achieve alignment, led to the selection of an interview based survey research method. The interview approach would permit the interviewer/respondent connection that is a necessary condition to obtain meaningful answers. The exchanges achieved in an interview context can help overcome many potential distortions. There is the

potential confusion due different uses of terms, a desire to present only a positive image for the company or a hesitation to admit that the question was not completely clear or fully understood. Also, given the broad range of the questions, a company might be in transition to a new set of S&OP practices, where the correct response requires judgment as to whether the most representative response is the former state or to-be state. Similarly, in large companies there might be heterogeneous levels of practice and again a judgment is required to select what the preponderance of practice is at the company. A questionnaire approach would not fit with the constraints of the sensitive, nuanced definitions and operationalized constructs and ambiguous heterogeneous practices, thus requiring interviews at a minimum. The intention to provide the broad spectrum appropriate for a descriptive study made multiple case studies impractical and overly resource intensive.

The dual concerns of complex sensitive questions regarding ambiguous practices along with the descriptive nature of the research objectives led to a research methodology choice of survey through interviews. The interaction possible through interviews permitted the establishment of trust and credibility necessary for transparency. However, given the time investment required for interviewing respondents, this generates a natural limit on the number of participating companies in the survey in comparison with a questionnaire approach. This is also true for the respondent, as interviews require more time and effort than a questionnaire. The interview must be scheduled and the time occupied is invariably

higher than to complete a questionnaire. The requested investment and desired level of trust and credibility led to a collaborative effort in approaching and conducting the interviews.

Gartner, the supply chain advisory company, agreed to partner in the conduct of the research. Gartner is a for-profit advisory company that earns revenue through subscription fees from participating companies. Participating companies look to Gartner to provide research, peer networking, vendor evaluations, conference forums and access to subject matter experts in all aspects of supply chain management. They were a natural partner for this research approach that would require extensive field contacts and has a research question oriented to the realities of the multimodal supply chains these practitioners deal with.

Gartner was approached with a short treatment of the PhD research topic, conceptual link to Management Control and research questions. Their response was enthusiastic and their lead analyst for S&OP was made available for the research. Gartner did not modify the topic or the research questions in any way, and did not take the lead in developing the interview questionnaire.

Collaboration with Gartner allowed for a broader selection of companies to approach by virtue of Gartner's extensive network of clients. This network was coupled with the author's personal connections to generate a prospective list of companies.

Additionally, the inclusion of Gartner also permitted the interviews to be conducted by two people. Given the risk of ambiguity of terms and interview bias that could layer over the testimony, this served as a quality check of the evidence and agreement on the understanding of the testimony.

With the research objective in mind of exploring S&OP governance and alignment on multi-nodal supply chains, the companies chosen and approached were based on matching the theory criteria: large multi-nationals likely to have complex multi-nodal supply chains. No particular industry area was focused and was only limited by the population of companies available through connections.

In all 35 companies were approached, of which all but one accepted to be interviewed. A summary of the companies interviewed is detailed in Table 5. For each company the respondent was able to speak to the organization's S&OP capability and process. In many instances it was the head of S&OP at the center of excellence. For others it was the operational head of S&OP globally or regionally. In some cases it was the head of operations for the company, encompassing S&OP into their broader responsibilities. The participating

companies were of significant size, with average 2014 sales of about 32 million USD and nearly half of the 34 companies ranked in the Fortune Global 500. Several industry sectors have representation with 7 sectors participating: Consumer Goods, Life Sciences, Apparel, Electronics, Chemicals, Automotive and Industrial.

The interview questions were structured to build up an understanding of the governance and success or failure of alignment in the S&OP process. The interview questions may be found in Appendix A. The interviews were generally one hour in length, with some companies agreeing to a second session when time ran short. All but one company agreed to have the interview recorded, and transcriptions were written. All companies were guaranteed confidentiality and so will not be identified here in respect of that understanding.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	
Company Sector	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Life Sciences	Life Sciences	Life Sciences	Life Sciences	Life Sciences	Apparel	Apparel	Electronics	Electronics	Electronics	Electronics	Electronics	Electronics	Electronics	Chemicals	Chemicals	Automotive	Automotive	Automotive	Industrial	Industrial
Company Sales 2014 MUSD	50,000 - 60,000	<10,000	<10,000	10,000- 15,000	90,000 - 100,000	20,000 - 30,000	20,000 - 30,000	<10,000	20,000 - 30,000	<10,000	20,000 - 30,000	70,000 - 80,000	<10,000	20,000 - 30,000	<10,000	40,000 - 50,000	<10,000	30,000 - 40,000	10,000- 15,000	<10,000	<10,000	30,000 - 40,000	<10,000	10,000- 15,000	<10,000	<10,000	10,000- 15,000	50,000 - 60,000	90,000 - 100,000	150,000 - 160,000	40,000 - 50,000	60,000 - 70,000	30,000 - 40,000	30,000 - 40,000	
Company Headquarters	Europe	Europe	Europe	Europe	Europe	Europe	USA	Europe	Europe	Europe	USA	USA	Europe	Europe	Europe	Europe	Europe	Europe	USA	USA	Europe	Europe	USA	USA	Europe	Europe	Europe	USA	Europe	USA	USA	Europe	Europe	Europe	Europe
Company Employees 2014	150,000 - 200,000	<50,000	<50,000	<50,000	300,000 - 350,000	50,000 - 100,000	<50,000	<50,000	<50,000	<50,000	50,000 - 100,000	150,000 - 200,000	<50,000	<50,000	<50,000	100,000 - 150,000	<50,000	50,000 - 100,000	<50,000	<50,000	<50,000	100,000 - 150,000	<50,000	<50,000	<50,000	<50,000	100,000 - 150,000	50,000 - 100,000	100,000 - 150,000	200,000 - 250,000	150,000 - 200,000	150,000 - 200,000	100,000 - 150,000	100,000 - 150,000	
Fortune 500 Ranking 2015	101 - 200	NR	NR	NR	1 - 100	301 - 400	NR	NR	NR	NR	301 - 400	101 - 200	NR	NR	NR	201 - 300	NR	301 - 400	NR	NR	NR	301 - 400	NR	NR	NR	NR	NR	101 - 200	1 - 100	1 - 100	201 - 300	101 - 200	201 - 300	301 - 400	301 - 400
Contact Title	Head of S&OP, COE	Vice President Planning	Manufacturing Supply Chain Director	Western Europe Supply Chain Director	Group Head Demand & Supply Planning	Global Head of Supply Chain Standards	S&OP Senior Consultant	Head of Operations	Group Planning Director	Head of International Planning	S&OP Planning Manager	Senior Director Planning COE	Director Central Demand Planning	Head of SupplyChain Planning COE	VP Global SupplyChain	AVP Europe SupplyChain	Global S&OP Lead	VP Integrated Business Planning	EMEA S&OP Director	Senior Manager planning Europe	Head of Operational Excellence	Head of Group Supply Strategical Process	Director Global S&OP	Senior Director SupplyChain	Senior Manager SupplyChain Management	VP Supply Chain	S&OP Manager	Global SupplyChain Director	VP Supply Chain Planning Processes	Demand Planning and SupplyChain Processes Improvement Director	Director SupplyChain Planning	Head Global SupplyChain Performance	VP Integrated Business Planning	VP Global SupplyChain Planning and S&OP	

Table 5 – Participating Companies Summary

2.5 *A Word on Epistemology*

It must be pointed out that this PhD thesis is in a relatively unusual context. It is not the logical extension of a master's research program into a PhD research program, nor is it an element in a broader research effort into which a PhD candidate will enlist with others. It is informed by and has its genesis in years of experience on the part of the author as a practitioner. Given this, it is even more important than in a typical case that the epistemological positioning of the research be properly considered and clearly articulated.

Research Philosophy

It's tempting to look at research in supply chain management and quickly assume that the underlying research philosophy will and should be positivist. The evidence are usually real, tangible objects such as production plans, stock target calculations, inventory levels, service levels and forecast accuracy and can create a dynamic where the results should be seen as absolute truths.

I don't believe this to be entirely the case.

Every discussion I have had about supply chain management with a colleague from outside my company has invariably gotten bogged down and slowed by a ritual of alignment of terms. A term that might have a very specific meaning for me may have a wholly different one for

my counterpart, and both of ours might differ from a textbook or academic definition. This is particularly true for titles. Supply chain management literature has for some time now used the term 'logistics' to imply physical aspects of supply chain management such as warehousing and transportation (Larson, Poist and Halldorsson 2007). Yet I continue to meet people who consider 'logistics' interchangeable with 'supply chain'. The result is that when I meet a new counterpart, we must spend time discussing to be sure that we are not talking past each other in our understandings of our roles and responsibilities. This doesn't appear to be a problem for other areas of operations like quality or production. It seems to be a uniquely supply chain management problem. Even in that last sentence someone might tell me that operations and supply chain management are interchangeable terms, and they would have a point, despite best efforts to develop a harmonized terminology (Li, Su and Chen 2011, Zhou, W. C. Benton, Schilling and Milligan 2011).

This elementary example of ambiguity is emblematic of what occurs when the discussion turns to more tangible artifacts. A demand plan might mean an unconstrained sales ambition to one person but might mean a constrained, realistic plan to another. Unless the interviewer embarks on a hopeless effort to have complete alignment of every term that pops up these ambiguities are real and present potentially consequential risks. Interviews can be sufficiently structured as to avoid most misunderstandings and noise through subjective interpretation on the part of the informant, but it is not plausible to imagine that these risks can be fully mitigated because the nature of the research explores in part ideas that can be

'fuzzy' for most people. The notion of solid line/dotted line reporting has different implications in each company and each person, including the interviewer. I cannot help but be informed and interpret the answer I hear through the filter of how I have understood and navigated solid/dotted line reporting structures in the past. In other words, my strong supply chain experience brings its own set of biases (Chalmers 2013) .

In the explanation of the research methodology the risk of respondent bias was raised. The subject of the research can be seen as sensitive. The respondent is being asked to admit to failings and inadequacies of the current S&OP processes in their company. They are surely tempted to couch their answer so as to put their company and themselves in the most positive light possible. In order to see through this potential eventuality, the methodology had two interviewers, both with substantial supply chain management experience. This mitigates some risks and creates others. It mitigates the risk of respondent bias but increases the risk of misinterpretation of terms. In fact, after the first few interviews, I and my Gartner counterpart had to hold a separate meeting to ensure we were completely aligned on the meaning of a few key constructs.

Another potential blow to placing myself in a fully positivist posture is the inherent complexity of multi-national firms. The respondent may provide their best, honest answer to a question. But often the respondent was quick to say that the reply did not represent every instance in the company, and they have a very good point, one that has been recognized by

researchers in the past (Speier and Swink 1995, Spalanzani, Ageron and Zouaghi 2016). The unit of analysis here, large multi-national firms, will certainly have different practices, or maturities of the same practice, in different business units and different geographies . This undermines the generalizability of the conclusions even within the firm much less to all firms in the same cohort (Yin 2013).

For these reasons, I'm comfortable asserting that my research is positioned *towards* a positivist approach but not fully positivist. The responses will be largely sincere and the transcripts of interviews accurate. While I believe there is an underlying reality that exists, there is nonetheless a risk of distortion. The distortion could be due to my biases as I interpret the informant, it could also be misunderstood common terms like solid/dotted line, and it could also be incomplete transparency in the part of the informant who perhaps will look to put their reality in a positive or negative light. It is legitimate to not be fully positivist when looking at supply chain management issues from a management perspective. There might be a better argument if the question were a safety stock calculation or a queue time. But the moment people are involved in the evidence, then I believe it is difficult if not impossible to present the data in a fully positivist approach.

Consistent with this posture, in order to develop the typology and analysis in this research, some inevitable interpretation of the respondent testimony is required. The words the

respondent uses to describe their organization must be layered with my understanding.

There is an ambiguity that exists due to potential reasons for distortion measured above.

This leads to a positioning as a post positivist (Karlsson 2010). I believe ontologically that there is a *mostly* unambiguously reality, but I am critical as to my ability to completely access it with certainty. But we can get very close and must try.

And what of the contribution and knowledge I hope to offer? Will it correspond perfectly to a universal truth? Is it valid in all cases? Of course not. Supply chain management will evolve for a very long time. My work will only be pertinent relative to this era. My findings cannot be decoupled from their business context, so cannot be an objective truth, again consistent with post positivism (Thiétart 2014) and personal refutation of positivism in my posture.

Continuing this line of thinking, the deliverable framework aims directly to help companies perform better, rather than exposing a universal truth independent of applications. For this reason, I place it at 'Performativity' in its relation to society and science (Thiétart 2014).

Exploratory vs Descriptive vs. Confirmatory

The research method here is clearly of an exploratory nature. While it's true that there is a proposition in mind at the start, it is not at the level of a fully formed hypothesis, and

certainly not an element of an accepted theory that we are looking to confirm positively (if that is even possible) or falsify. There is no theory testing or even theory refinement here as the state of S&OP literature is not yet at a stage to consider the antecedents as constituting a theory that predicts results and explains a phenomenon (Eisenhardt 1989, Voss, Tsikriktsis and Frohlich 2002, Eisenhardt and Graebner 2007, Barratt, Choi and Li 2011, Ketokivi and Choi 2014).

Rather, the objective of this research is to gain preliminary insight into anecdotally observed phenomenon, the interplay between S&OP and the accounting objects and territories in multi-nodal firms. The hope, even ambition, is that there is a real contribution made to further articulate S&OP conceptualization and contribute a normative framework that may directly enhance practitioner performativity.

It would be reasonable to say that there is an element of descriptive research here, in that one of the most appealing aspect of this thesis to practitioners is the description of the different S&OP types and levels of success at alignment. Before digesting and passing judgement on the normative conclusions, practitioners are finding value in the descriptive elements and in the anecdotal opportunities I have had to share the research results with them.

Summary

This section has described the research design for this PhD. To summarize very briefly:

A detailed examination of the constructs used to operationalize S&OP governance provided a breakdown of the discrete tasks in the S&OP process in order to discuss responsibility with respondents.

In order to address the sensitive nature of the success of S&OP in achieving alignment in both horizontal and multi-functional dimension, a notion of transparency was employed. This questions the respondent on the presence of willful manipulation of the demand plan for the multi-functional dimension, and in the horizontal dimension alignment is operationalized through the notion of willful supply/demand imbalance.

3. RESULTS & ANALYSIS

This section will present the data collected from the field research and structure this data into a meaningful framework to help understand what stories it can tell us.

A detailed mapping of the governance present in each company is shown and summarized. From this rich data an S&OP governance typology has been derived and is shared and discussed.

Following that, this typology is then confronted to the success or failure to achieve S&OP alignment as per the respondent testimony. The links between S&OP typology and alignment are discussed and explored.

For further illustration of the nature of the S&OP governance types, a detailed look at an example company for each of the governance types is provided for deeper insight.

3.1 Presentation of Data

The data that is shared here is a rare opportunity, with 34 participating companies across 7 industry groups. All of the companies have global footprints, and indeed 15 firms are Fortune 500 companies. It is worth emphasizing that the respondents were transparent and open in their collaboration, a challenge for what can be a sensitive topic. They were often asked to provide frank feedback as to the shortcoming of the organizations they are part of, often lead and may have helped implement. The respondents were all senior supply chain managers in either corporate or operational roles, well placed to discuss the broad S&OP governance and alignment for their firms.

It is through the experience and acquired credibility of the researcher and the participation of Gartner that this unique level of participation was possible and the data collected for this research.

The interview transcripts were studied in order to develop the S&OP governance mapping detailed below. The conclusion for each company of the S&OP governance was discussed with the Gartner counterpart to ensure that there was mutual agreement on the nature of the company's governance.

In order to summarize and reduce the data collected through the interviews, the S&OP governance was mapped. Each core S&OP function at each company was coded as being either solid line, dotted line or not at all under the authority of the supply chain function. For example, if the demand planning process in a market was performed by a group with the title of supply chain, but this group had no hierarchical link with a greater supply chain organization at a regional, global, corporate or business unit level, then it was not considered under the authority of the supply chain function. If the group had a solid line to a market general manager and a dotted line to a broader supply chain management authority, then that was considered as dotted line.

In the event that supply chain team did not have authority over a core S&OP function or shared it with another function, the function had the direct or shared authority was mapped. For example, if production planning was performed at each factory under the direct authority of the factory manager and a dotted line to a broader supply chain management group, the fact that the factory manager maintained direct authority was mapped. In many companies, supply chain is a function that is part of a greater operations group that encompasses other technical activities, principally production. The distinction of supply chain function sharing or ceding S&OP authority with another function in the operations group is an important nuance, as the proximity to members of the same operations group may lead to greater alignment than if the functions were completely separated. The mapping thus includes this distinction

of the shared or ceded authority being to another function within operations, such as production, or to a non-operations function, such as finance.

Using this mapping scheme, each company's S&OP governance was mapped in a way that indicated where the supply chain function has solid line, dotted line or no authority, and which other functions share or replace that authority. Keeping in mind that the research objective to explore the links between S&OP governance and alignment, the mapping includes the results of the three alignment indicators of Table 4.

For the first two indicators, *Willful Demand Supply Imbalance* and *Willful Demand Plan Manipulation*, only 'yes' or 'no' answers were used. However, for the alignment indicator *Demand Plan/Financial Plan Alignment*, the answer 'planned' was also included, as several companies testified a strong interest and intention to implement this policy. Also included is the configuration of the supply chain, which is to say whether it is linear or multi-nodal. Though an effort was made to select companies believed to be multi-nodal, some global companies actually had linear supply chains. There were two reasons that accounted for this per the respondents. Firstly the company might produce goods that are poorly suited to multi-nodal production, such as fresh food products that must have a cold chain maintained. These products tend to be produced close to the final markets. Secondly, some companies had products with very little local differences or local customers. These companies tend to have structures that are more regional-organized than country-organized. So in other words

a regional manufacturing footprint aligned with a regional commercial structure in a linear supply chain.

The complete company mapping with both S&OP governance and alignment indicators is shown in Table 6.

		Company 1	Company 2	Company 3	Company 4	Company 5	Company 6	Company 7	Company 8	Company 9	Company 10	Company 11	Company 12	Company 13	Company 14	Company 15	Company 16	Company 17	Company 18	Company 19	Company 20	Company 21	Company 22	Company 23	Company 24	Company 25	Company 26	Company 27	Company 28	Company 29	Company 30	Company 31	Company 32	Company 33	Company 34		
Company Profile	Company Sector	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Consumer Goods	Life Sciences	Life Sciences	Life Sciences	Life Sciences	Life Sciences	Apparel	Apparel	Electronics	Electronics	Electronics	Electronics	Electronics	Electronics	Chemicals	Chemicals	Automotive	Automotive	Automotive	Industrial	Industrial		
	Multinodal	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes		
Core S&OP Functions	Manufacturing Supply Chain	Production Scheduling																																			
		Material Supply																																			
		Production Planning																											GM								
	Distribution S&OP	Demand Cases																											GM								
		Deployment/Utilization																											GM			F					
		Informational Stock Levels																												GM							
	Supply Planning	Market Supply Requirement				GM	GM	GM		GM	GM						GM						GM							GM		GM					
		Market Stock Level				GM	GM	GM		GM	GM						GM	GM					GM	GM					GM		GM						
		Market Service Level				GM	GM	GM		GM	GM						GM	GM					GM	GM					GM		GM						
	Demand Planning	Baseline Forecast		GM	GM	GM	GM	GM	GM	GM	GM	GM	F		GM	GM	GM	GM					GM	GM		GM	GM	GM	GM	GM	M	S	GM	S	F	GM	
		Launch Forecast	M	M	GM	M	M	GM	S	GM	GM	S	F	M	M	GM	GM	GM					GM	GM		GM	GM	GM	GM	GM	M	S	GM	S	F	S	
		Promo Forecast	S	S	GM	S	S	GM	M	GM	GM	M	F	S	S	GM	GM	GM					GM	GM		GM	GM	GM	GM	S	S	GM	S	F	M		
		Forecast Process		GM	GM	GM	GM	GM		GM	GM	GM	F		GM	GM	GM	GM					GM	GM		GM	GM	GM	GM		S	GM	S	F	GM		
Alignment	Demand Planning Level	Market	Market	Market	Market	Market	Market	Market	Market	Market	Market	Market	Region	Market	Market	Market	Market	Region	Market	Market	Region	Global	Regional	Region	Region	Global	Market	Region	Region	Region	Region	Region	Region	Market	Market		
	Demand Planning Level Same as P&L?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
	Willful Supply/Demand Imbalance	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No		
	Willful Demand Plan Manipulation	Yes	No	No	Yes	Yes	No	No	No	Yes	No	Yes	Yes	No	No	No	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes		
	Forecast Monetized	Yes	Planned	Yes	Yes	Yes	Yes	Yes	Planned	Yes	Yes	No	Planned	Yes	Yes	Planned	Planned	Planned	Planned	Yes	Yes	Planned	Planned	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Planned	No	Yes		
	Forecast/Finance Comparison	Yes	Planned	Yes	Yes	Yes	Yes	Yes	Planned	Yes	Yes	No	Planned	Planned	Yes	Planned	Planned	Planned	Planned	Yes	Yes	Planned	Planned	Planned	Yes	Yes	Planned	Yes	Yes	No	Yes	Yes	Planned	No	Yes		
	One Set of Numbers	No	Planned	Yes	No	No	Yes	No	Planned	No	Yes	No	Planned	Planned	Yes	Planned	Planned	Planned	Planned	No	Yes	Planned	Planned	Planned	No	Yes	Planned	No	No	No	Yes	Planned	No	No			

Operations is considered as all industrial activities that are not always classed at Supply Chain: Production/Manufacturing, Quality, Sourcing

F/M/S/GM = Finance, Marketing, Sales, General Management








	Solid Supply Chain line with no dotted line
	Solid Supply Chain line with non-Operations dotted line (F/M/S/GM)
	Solid Supply Chain line with Operations dotted line
	Dotted Supply Chain line with non-Operations solid line (F/M/S/GM)
	Dotted Supply Chain line with Operations solid line
	No Supply Chain line with Operations solid line
	No Supply Chain or Operations dotted or solid line (F/M/S/GM)

Table 6 – S&OP Governance Mapping

3.2 S&OP Governance Typology

3.2.1 S&OP Governance Typology Matrix

To begin to understand how S&OP governance may lead to successful alignment, we must reduce this data and attempt to derive representative types. In order to do this we will select a core S&OP function at either end of the horizontal alignment as a proxy for the influence the supply chain function has over that end of the supply chain, be it upstream or downstream.

For manufacturing supply chain the core S&OP activity of production planning is the most useful and valid core S&OP activity. This is the activity where key manufacturing constraints are identified, captured and weighed against the supply needs identified in the demand consolidation. Production planning is understood here to mean the moment of decision for what production the factory will produce or is projected to produce. Note from the data in Table 4 that no multi-nodal company had supply chain management in either dotted or solid line authority in other manufacturing supply chain activities and not production planning. In other words, the first activity which a manufacturing site would cede authority to the supply chain management is production planning before any others.

So it is reasonable to state that a company that has supply chain management retaining some authority on the production planning in some way has enabled supply chain management to influence the manufacturing supply chain role in S&OP at least in part.

Taking a similar approach to the multi-functional downstream end of the S&OP process, the most suitable representative S&OP core function is the authority of the demand planning process. There were no instances of the supply chain function exerting a form of authority over other areas of demand planning generation and not over the demand planning process itself.

It useful at this point to take the time to ensure the clarification of a few terms that were used during the interviews and are generally understood by practitioners in a common way, as we did above for production planning. The terms 'demand planning' and 'demand plan' are used here to describe the set of volumes used to trigger operational activities in the company. They are meant to be the unique and privileged means by which factories and other upstream actors initiate and execute their functions.

'Financial plans' and 'financial planning' refer to the business activity of budgeting and/or trending the top line (and occasionally bottom line) performance of the commercial entity. Some companies only do annual budgets, while others refresh these financial plans at key points during the year. They often constitute the performance commitment general

managers make for their managerial scope. The term 'financial plans' describes this common activity.

'Sales plans' and 'sales planning' are used to describe the planning of purely commercial activities led by the sales force. This may include promotional planning by product range, region or account. It has in its scope the sizing of the initial pipe fill orders for launches and the first replenishment orders. The sales force, with their proximity to the customer market, will also plan for changes in customer inventory strategies, new account growth, new distribution channels or existing account growth.

The term 'marketing plans' mean to identify the strategic moves made on the offer itself. This could be launches or discontinuations, media plans and spend or changes in positioning of the product that will impact the forward volumes.

Using these two core S&OP functions, the S&OP governance can then be captured in a three by three matrix as shown in Figure 5.

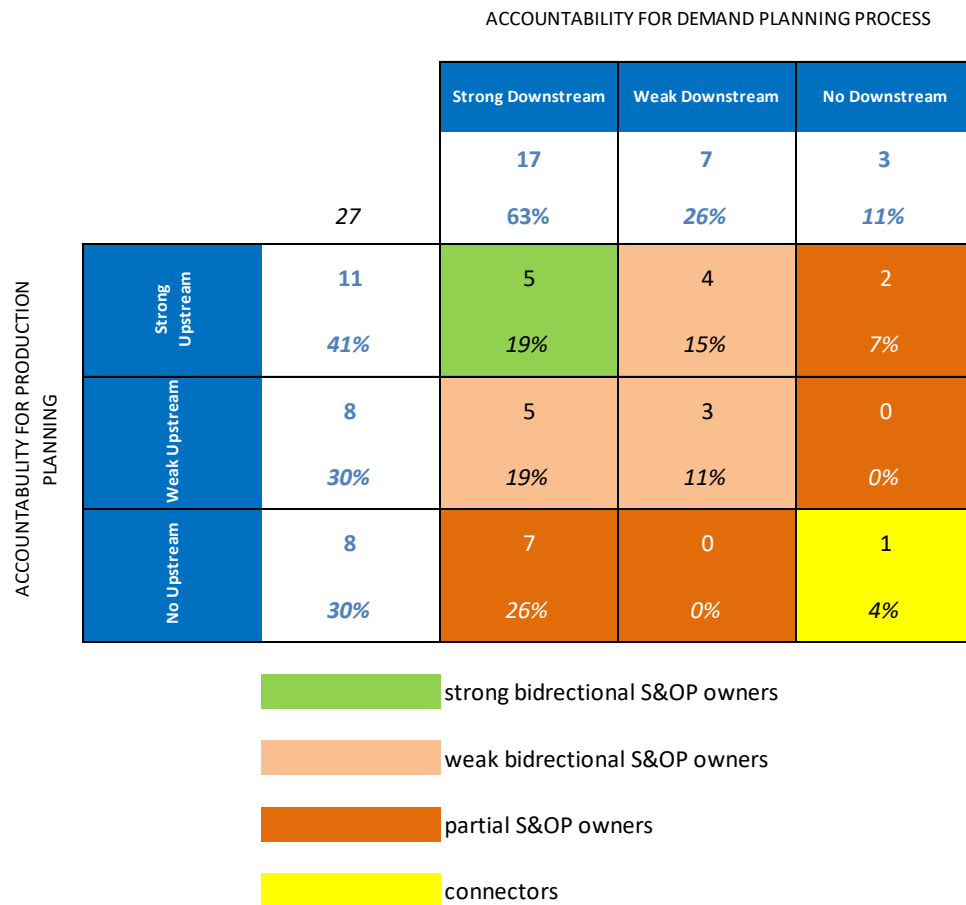


Figure 5 – S&OP Governance Typology Matrix

The matrix in Figure 5 summarizes the number and percentage of multi-nodal companies in which the supply chain function has strong (solid line), weak (dotted line) or no authority over the upstream S&OP (as represented by the production planning activity) or downstream S&OP (as represented by the demand planning process activity).

Note that the total number of companies in the matrix is 27, and not the 34 companies listed in Table 4. 7 companies were removed from the typology analysis for 2 reasons. Firstly, 5 companies were classified as having linear supply chains and so did not fit the declared scope.

The intention is to develop types for complex, multi-nodal supply chains. The 5 linear companies would serve for a later comparison base, however. Secondly, the two apparel companies have wholly outsourced manufacturing. While some of the S&OP challenges may be similar for companies in this configuration, it was felt these two firms did not have the S&OP governance questions being addressed here. The nature of multi-nodal supply chains is to have the two axes of alignment occurring in multiple instances in parallel. For companies that fully outsource, there may indeed be behaviours that merit attention, but it was felt the dynamics would not be similar to firms who have decided to internalize the majority of their manufacturing.

Figure 5 allows us to see 4 types of S&OP governance that emerge:

Strong and Weak Bidirectional S&OP Owners

There are companies that have strong or weak authority over *both* the upstream and downstream core S&OP functions at the same time. There are 17 companies in this case, or nearly two thirds of the companies interviewed. These companies have an S&OP governance led at least weakly by the supply chain management that spans across multiple markets into multiple factories in a multi-nodal supply chain configuration. Of these 17 companies, 5 companies have the supply chain management exerting a solid line authority over both ends of the S&OP process. The supply chain management, through their authority over the two extremes of the S&OP alignment process, do more than simply move information along to

disparate internal actors, they exert influence and authority over the dual constraints of the S&OP process that needs aligning: supply and demand. They are truly the owners of the horizontal alignment process of S&OP. The 5 companies that have solid line, or strong authority, over both upstream and downstream can be termed *Strong Bidirectional S&OP Owners* and those that have at least one of the upstream or downstream authorities in dotted line, or weak authority can be labeled *Weak Bidirectional S&OP owners*.

To help describe what is meant by these new terms Strong Bidirectional S&OP Owners and Weak Bidirectional S&OP Owners, they are illustrated in Figure 6 and Figure 7, respectively.

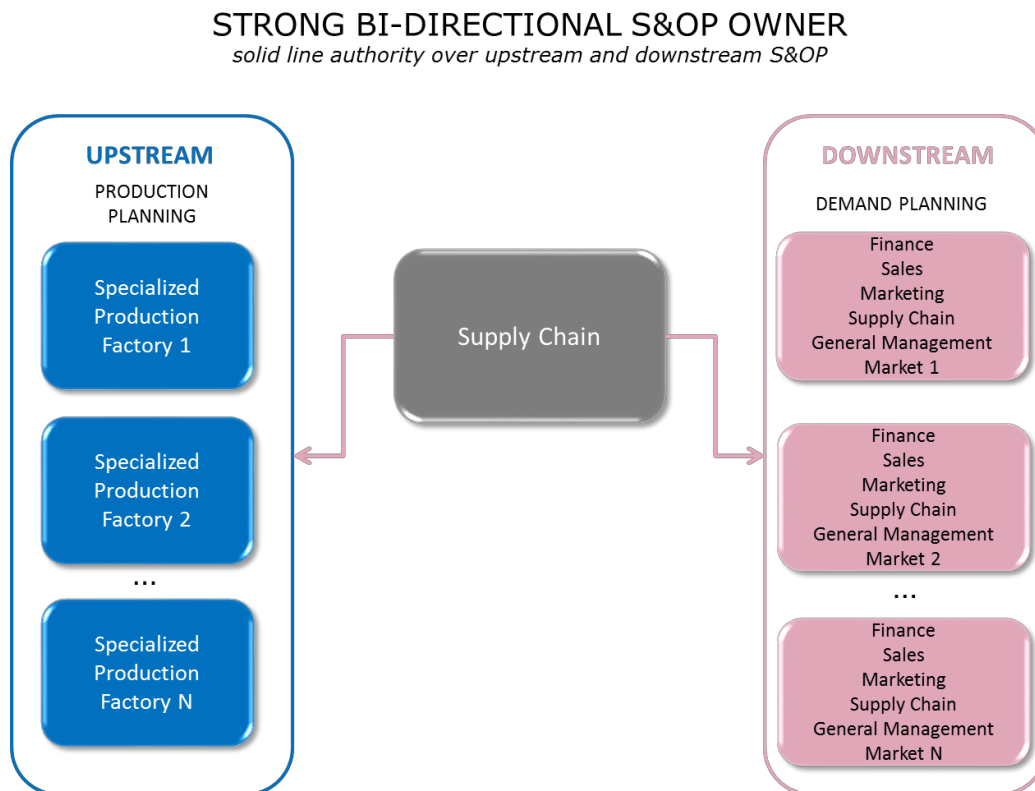


Figure 6 - Strong Bidirectional S&OP Ownership

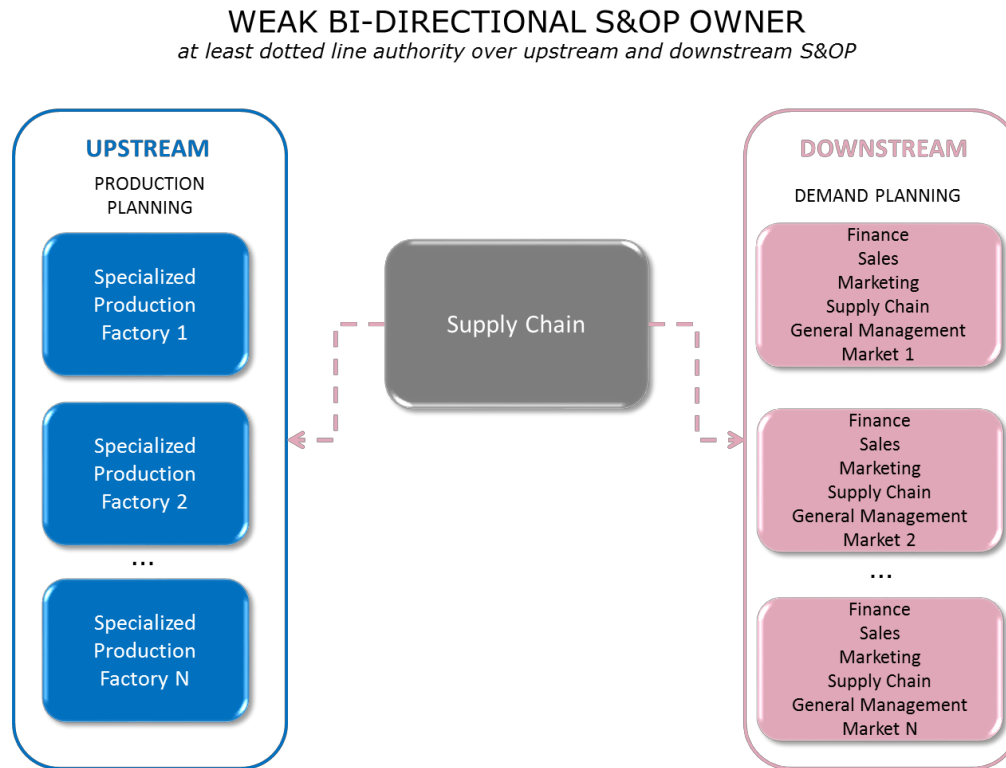


Figure 7 - Weak Bidirectional S&OP Ownership

Partial S&OP Owners

There are 9 companies that have solid or dotted line authority over one of the two ends of the S&OP process, but have no authority at all over the other. The supply chains of these companies cannot exert influence over the whole S&OP process, at least not in a formal fashion. It is difficult to frame the supply chain management in these companies as owner and orchestrator of the entire S&OP process. These companies are labelled here as *Partial S&OP Owners* and this term is illustrated in Figure 8.

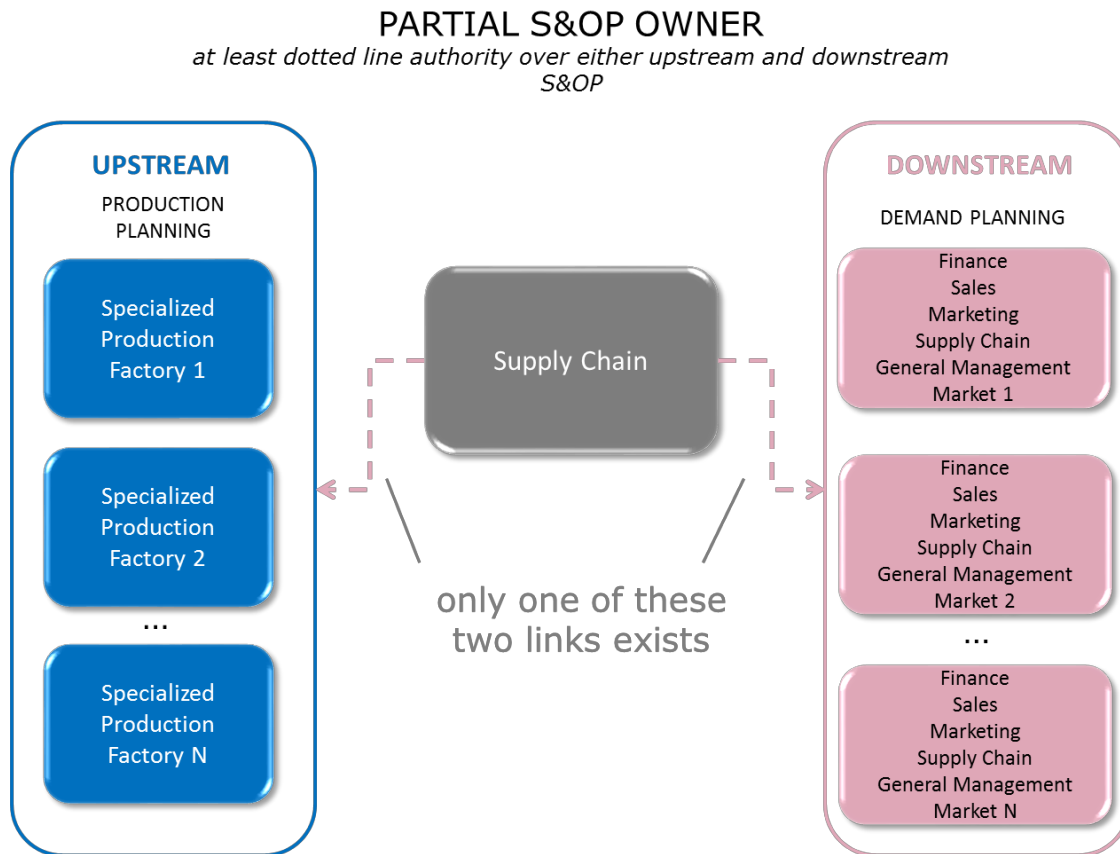


Figure 8 - Partial S&OP Ownership

Connectors

Lastly, there was one company in the unique position of having the supply chain management possessing no solid or dotted line authority over either end of the S&OP process. This type of governance is simply a *Connector*. It would be difficult for this company to argue that the supply chain management is influencing and orchestrating either the generation of a true demand plan or a supply plan to answer it when they have no influence on the process or the result in either alignment. This is illustrated in Figure 9.

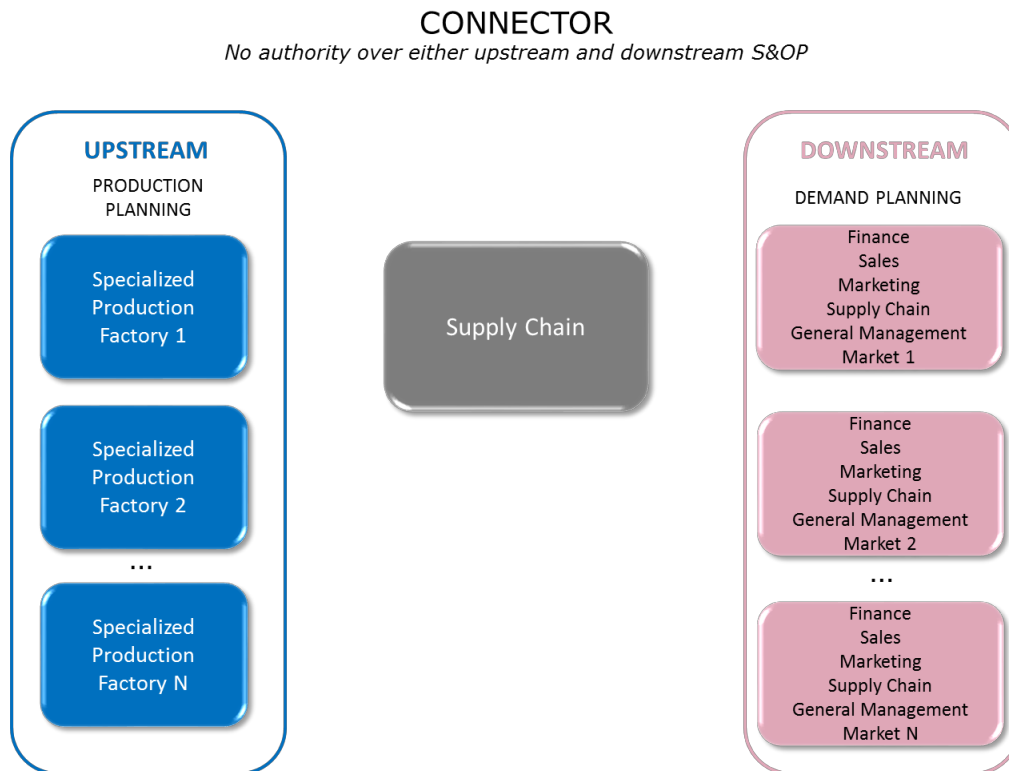


Figure 9 - S&OP Connector

This result is a bit startling. Over one third of the companies, 10 companies in all, interviewed are Partial S&OP Owners or Connectors. The planning of *what* a company should produce, *will* produce and *when* they produce it are the key operational deliverables of the S&OP process. For 10 of 27 of the respondent companies, a significant part of the S&OP process – the heart of the *raison d'être* of the supply chain management – is not under the authority of a broader supply chain organization.

In summary, the matrix approach has generated four different S&OP governance types:

Strong Bidirectional S&OP owners, Weak Bidirectional S&OP Owners, Partial S&OP Owners and Connectors. The next step is to explore to what extent these four typologies succeed or

fail in achieving the two S&OP alignment objectives in the horizontal and multi-functional dimensions.

3.2.2 Examples of Each S&OP Governance Type

With the data analysis and the link between S&OP governance established, it is worthwhile taking a closer look at each S&OP governance type and understanding the sort of context within which they appear and the perspectives and insights of the respondents. By describing the particular context, in the words of the company expert, the differences between the S&OP governance types and their links to S&OP alignment will become more apparent.

To do this a sample company for each of the four S&OP governance types was chosen for a more detailed dive into the testimony. Deeper description and examination of the testimony can shed light on the manner in which each of these types views their S&OP, its strengths and weaknesses and the opportunities, each one in its context.

The companies used here to illustrate the different S&OP governance types were chosen by looking for respondents who were most actively engaged and expansive in their testimony. To ensure a common element, all four companies do not have a firm policy of aligning the demand and financial plans. This allows for a more rich testimony since there is a higher likelihood of misaligned behaviours to expand upon.

Connector

The Connector company is a Fortune 500 company with between 30 and 40 billion USD in annual revenues. The company is headquartered in Western Europe and employs between 150,000 and 200,000 people in about 100 countries. There are over 100 manufacturing sites. They are a world leader in utility, transport and infrastructure technology (source company website). It is company 33 on Table 5.

The S&OP governance mapping for the lone Connector company is below in Figure 10.

			Core S&OP Functions																
Company Profile			Manufacturing Supply Chain		International S&OP		Supply Planning		Demand Planning		Alignment								
Company Sector	Multinodal		Production Scheduling	Material Supply	Production Planning	Demand Coord	Deployment/Reliability	Inventory of Stock Levels	Affiliate Supply Management	Affiliate Stock Level	Affiliate Capacity Level	Detailed Forecast	Launch Forecast	Point Forecast	Forecast Process	Demand Planning Level	Willful Supply/Demand Imbalance	Willful Demand Plan Manipulation	One Set of Numbers
Company 33	Industrial	Yes										F	F	F	F	Market	Yes	No	No

Operations is considered as all industrial activities that are not always classed as Supply Chain: Production/Manufacturing, Quality, Sourcing

F/M/S/GM – Finance, Marketing, Sales, General Management

Solid Supply Chain line with no dotted line

Solid Supply Chain line with non-Operations dotted line (F/M/S/GM)

Solid Supply Chain line with Operations dotted line

Dotted Supply Chain line with non-Operations solid line (F/M/S/GM)

Dotted Supply Chain line with Operations solid line

No Supply Chain line with Operations solid line

No Supply Chain or Operations dotted or solid line (F/M/S/GM)

Figure 10 - Connector Company S&OP Governance Mapping

The respondent for the Connector company, the only example in the study, is an executive at the corporate supply chain management group, responsible for best practices and change initiatives in planning. His words will be used as much as possible to illustrate the context of the company.

The business is primarily engineer to order. This puts an emphasis on manufacturing and sourcing rather than on logistics. They are, as the respondent put it, '*very diverse*'. The company is divided into divisions according to the nature of the products. Within each division there are business units that further granulate the sales channels. Each division, business unit and country has a general manager and a P&L. Even each factory has a P&L. The situation is described as '*there are P&Ls everywhere*'.

Manufacturing plants service different business units and divisions. It is considered an internal sale, and each business unit is encouraged to make these transactions profit centers as though they were external sales, and maximize profits from their perspective at every opportunity. There is a significant amount of outsourced production.

The term 'supply chain management' in this company refers to what would commonly be considered the sourcing function, negotiating commercial arrangements with vendors. There is no supply chain planning function that mediates between the business units (either centrally or in markets) and the factories. The demand planning is done in each market in a function that reports under finance. There is no consolidation of demand or arbitration of resources at an international level. Information flows directly from each business unit in each market to each factory. Production planning and supply decisions are made at the factory level.

The respondent described the behaviors that he has observed, that are driven in large part by the current governance structure. They would not be what one would consider behaviours observed when there is an alignment of supply and demand.

The fact that the factory is driven by profit means it *'benefits in producing early shipping to customers business unit and invoicing as soon as possible or recognizing revenue one way or another to achieve the revenue target and the profit as well.'* For large turnkey projects, there are many risks of delays as the capital invested are significant and there are many actors, often political ones. The customer-facing groups often do not share when delays are encountered, for fear of not having the goods ready and so are *'risk-averse.'* On the manufacturing side, the lead times are long and exaggerated even more so that the best, most optimal production slot can be identified, so even if they are advised of a delay it is likely the goods have already been produced and pushed downstream. The result is high inventory with unclear accountability in order to drive fully optimized production. It appears from the testimony that lead time is not currently considered a potential competitive differentiator, making it difficult to challenge the existing practice.

When asked about the KPIs used to measure supply chain performance, particularly as seen from the factory perspective, the response was, *'There is a global reporting of on time delivery, there was a shift a year ago from an internal on time delivery to a customer request on time delivery but that's it. Typically a supply unit has no visibility of their products to the final customer. They would measure their own on time delivery, ex works, though whether the*

products are delivered late to the final customer, they don't have a clue.' Taking a broader view of the incentives that drive behavior, the description is consistent with that of the governance of the supply chain: *'Everyone is going to go for revenue and profit first, even if it's a local metric, not (company) revenue and profit but the local P&L revenue and profit. That will be the primary driver for any type of decision. That makes the company successful, in a way, on revenue and profit. Not on other KPIs, that's why we need to rebalance what people are doing.'*

Demand planning is firmly in the grasp of the business unit and market general managers: *'I want to do my own forecasts because I am a P&L owner.'* With demand planning being under finance, it is no surprise that financial trends take precedence. In the words of the respondent, *'The one forecast that matters is the financial forecast, which is in millions of dollars, and it's difficult today for most of the business units to show connections between the SKU level forecast being put into SAP for driving supply, to make the link between that forecast and the financial plan which forwarded up for financial planning and group consolidation. We usually have disjointed forecasting processes, but the one that matters is the financial one.'*

One challenge to obtaining alignment is that demand planning, as a separate and distinct role from financial planning, is not yet in the company vision. *'There are no demand planners (here). We've created the job description this year and we are trying to map the organization to those new positions, but I don't think we have any full time demand planners, someone whose role is to create a forecast on a monthly basis, that goes from quantities of material*

that can be aggregated to value by product families and so on, taking input from marketing, from sales, from statistical models and those kinds of things. We don't have that function today.'

In the engineer to order model, the respondent explained that the lack of rigour in demand planning is usually not penalizing at an operational level for the factories, since there is often a larger order book that has a horizon of several months and this is sufficient for managing the resources, capacity and material supply. However, visibility further out would help in the tendering process and in the event of extreme resource constraints and for capital allocation decisions. In an interesting exchange, the respondent explained that the annual budgeting process is inadequate for this, *'as in most companies it is biased by objectives, by targets set.'*

When asked if the company was aligning the demand plan with the financial plan, the response was clear and merits transcription here in full. *'I haven't found any business unit that has the ability to demonstrate that the operational plan, what we put in SAP for driving production and procurement, is aligned with the financial plan. There is usually a disconnection. Because we have a budget in millions of dollars and no one is effectively doing a translation into quantities of products.'* This testimony speaks for itself that this company is unable to achieve either S&OP alignment.

The company believes that the current S&OP governance is inadequate, and is taking steps to bring about change. The first step is to install a supply chain planning at the global level in

each business unit, acting as a liaison between the markets and the factories. This position has no hierarchal authority over either end, however, be it solid or dotted line. It is hoped that this new role, after bringing value that is recognized by senior management, will be expanded into a true supply chain governance that spans the S&OP process from end to end. Until that time, this company is considered a Connector as the supply chain management has not dotted or solid line authority over either demand planning or production planning.

Partial S&OP Owner

The Partial S&OP Owner company is a midsize multinational company with between 10 and 15 billion USD in annual revenues. The company is headquartered in Western Europe and employs under 50,000 people in about 60 countries. There are over 20 manufacturing sites. They are a significant global player in consumer goods, particularly cleaning products and personal care. (source company website). It is company 4 on Table 5.

The S&OP governance mapping for the Partial S&OP Owner company is below in Figure 11.

			Core S&OP Functions																
Company Profile			Manufacturing Supply Chain			International S&OP			Supply Planning			Demand Planning			Alignment				
Company Sector	Multinodal		Production Scheduling	Material Supply	Production Planning	Demand Coupling	Localization/Allocation	International Stock Levels	Aggregate Supply Requirements	Aggregate Demand Level	Aggregate Demand Level	Demand Forecast	Material Forecast	Production Forecast	Forecast Process	Demand Planning Level	Willful Supply/Demand Imbalance	Willful Demand Plan Manipulation	One Set of Numbers
Company 4	Consumer Goods	Yes							GM	GM	GM	GM	M	S	GM	Market	Yes	Yes	No

Operations is considered as all industrial activities that are not always closest to Supply Chain: Production/Manufacturing, Quality, Sourcing

F/M/S/GM – Finance, Marketing, Sales, General Management

Solid Supply Chain line with no dotted line

Solid Supply Chain line with non-Operations dotted line (F/M/S/GM)

Solid Supply Chain line with Operations dotted line

Dotted Supply Chain line with non-Operations solid line (F/M/S/GM)

Dotted Supply Chain line with Operations solid line

No Supply Chain line with Operations solid line

No Supply Chain or Operations dotted or solid line (F/M/S/GM)

Figure 11- Partial S&OP Owner Company S&OP Governance Mapping

The Partial S&OP Owner company has developed a lean business side structure, with no operating divisions. There are 3 segments according to product category, but this is only at a marketing level. The geographic granularity is stronger, as there are zones made of regions which are comprised of countries. P&Ls are at each geographic level.

From a supply chain management perspective, each region has a supply chain management head, who reports in a dotted, functional line to the head of the region. The regional supply chain management head reports into a supply chain management director at the zone level. This approach extends into the countries. Each country has a supply chain manager who solid line reports into the regional supply chain management head and dotted line reports into the local country general manager.

For this company, the scope of the supply chain management includes demand planning and other non-S&OP activities such as customer service, distribution and transportation. The respondent is the head of supply chain for both a European country and the Western Europe region.

Focusing on demand planning, the supply chain management is not accountable for the entirety of the scope of demand planning. The respondent describes the allocation of responsibilities in this way: *'We orchestrate. The marketing is accountable to provide the forecasts for NPDs. The sales is accountable for providing the promo forecast. We collect all*

this, we put a baseline forecast on the standard products, the ongoing products, and we are accountable for the total forecast to the business.' When asked if the supply chain management was empowered to challenge marketing or sales on the nature and content of the promotion or NPD forecasts, the response was clear. *'We're not very mature. That's where I want to go. Today we are a transcription service. There is no notion of challenge or of co-building. There's some, but very little.'*

Despite this, the supply chain function is considered accountable for the whole of the demand planning accuracy. When asked what drove perceptions when there was an issue with the demand plan, *'this dotted line structure in general tends to lead to saying that supply (chain) did a poor job.'*

The respondent was very transparent about the manipulations that are done by the forecasts for promotions that are prepared by sales. Describing this very clearly as: *'There is a traditional and classic human bias where sales will in a general macro way under promise and over deliver, and in a micro way will want to guarantee their service level. So they will push their forecasts pretty high ... the aggregate financial plan promo with sales accountability is often moderated so that they can over deliver.'*

The supply chain function in each country does however monetize the demand plan every month and compare it to the latest financial trend. This has not yet risen to the level of driving better performance, however. This is due to two factors. The first is that there is no

policy of alignment that would require either the demand or financial forecast to align to the other. The second reason is that the financial planning process is not considered credible by the internal actors. As described by the respondent, *'In general there's not much energy put in by finance into this financial number, they are very lean. So 9 times out of 10, it is the supply chain [management] numbers that is the more accurate. They are looking in the rearview mirror, not necessarily ahead.'* The result is that the gaps between the monetized demand plan and the financial plan are calculated, but not analyzed or leveraged.

Notably, the scope does not include supply planning, the decision of how much inventory to deploy to each market to meet demands. This is done directly in the factories. There is no supply chain planning function that mediates between the business units (either centrally or in markets) and the factories. Production planning and supply planning is done at each factory in parallel, and communication is done directly between each market and each factory with no intermediary. The information flows are extremely complex for each party, as one factory may supply up to 60 markets.

The production and supply planning, critical elements of the S&OP process, are not under any authority of the supply chain management. Each plant director works for a manufacturing director in the region, who then works for the counterpart of the zone supply chain management head, the head of manufacturing zone.

The lack of presence of the supply chain management in the factories has not inhibited the service oriented nature of manufacturing. This appears to be a prominent cultural strength in this company. The impression that is left, though, is a manufacturing organization that is comfortable living in very high stability, to the point of undermining production efficiencies:

'The factories start from the idea that the forecast are poor and very volatile. So they do their production plan weekly, and more than the forecasts there is the order portfolio. That means that more or less they are very short term oriented. They can change their production plan completely for the next week. It often happens that they change their production plan in the current week.'

When asked if this came with a cost in terms of obsolete inventory or efficiency, the response was not surprising. *'There is a real desire to get this under control. Supply (chain) is becoming more and more accountable for obsolete inventory and asking questions to the factories. There is a colossal cost to this flexibility. So our real strength is to provide high service levels but at a cost. A cost of micro-management, over-reactivity and then obsolescence.'*

It appears that inventory on the whole is not a current focus of senior management. The respondent explained that up until recently, the supply chain management was part of manufacturing and large production runs were always favored over any inventory impacts, and that quite simply *'it has never been an issue because it has never been a measure.'* The lack of a group mediating manufacturing and markets and piloting the overall S&OP is part of the challenge of making progress on improving working capital. *'It hasn't been up to now, but*

it is starting. In our ways of working between manufacturing and supply we're introducing the notion of max stock level. But it is happening bottom up, case by case. Because we have all the factories, all the markets, and it's a relationship that is n-to-n. There is no group at the European level, either in manufacturing or supply chain [management] that arbitrates.'

The overall image of the Partial S&OP Owner company is one of a company that has some great cultural strengths, but is suffering from incomplete S&OP governance both upstream and downstream. The Partial S&OP Owner type is warranted here as the supply chain management has no solid or dotted line authority over production planning. The supply chain management does maintain a certain level of authority of demand planning, and also over the management of the process itself.

Weak Bi-Directional S&OP Owner

The Weak Bi-Directional S&OP Owner company is a Fortune 500 company with between 40 and 50 billion USD in annual revenues. The company is headquartered in Western Europe and employs between 100,000 and 150,000 people in about 100 countries. There are over 100 manufacturing sites. They are a significant global player in life sciences and pharmaceutical products, both prescription and over the counter medications (course company website). It is company 16 on Table 5.

The S&OP governance mapping for the Weak Bi-Directional S&OP Owner company is below in Figure 12.

			Core S&OP Functions																
Company Profile			Manufacturing Supply Chain			International S&OP			Supply Planning			Demand Planning			Alignment				
Company Sector	Multinodal		Production Scheduling	Material Supply	Production Planning	Demand Control	Unbalanced/Imbalance	Inventory at Global Levels	Affiliate Supply Requirement	Affiliate Check Level	Affiliate Check Level	Detailed Forecast	Low Level Forecast	Planned Forecast	Forecast Process	Demand Planning Level	Willful Supply/Demand Imbalance	Willful Demand Plan Manipulation	One Set of Numbers
Company 16	Life Sciences	Yes								GM	GM	GM	GM	GM	GM	Model	Yes	Yes	Planned

Operations is considered as all industrial activities that are not always closed at Supply Chain, Production/Manufacturing, Quality, Sourcing

F/M/S/GM – Finance, Marketing, Sales, General Management

Solid Supply Chain line with no dotted line

Solid Supply Chain line with non-Operations dotted line (F/M/S/GM)

Solid Supply Chain line with Operations dotted line

Dotted Supply Chain line with non-Operations solid line (F/M/S/GM)

Dotted Supply Chain line with Operations solid line

No Supply Chain line with Operations solid line

No Supply Chain or Operations dotted or solid line (F/M/S/GM)

Figure 12- Weak Bi-Directional S&OP Owner Company S&OP Governance Mapping

The Weak Bi-Directional S&OP Owner company has a business structure of geography. The current structure is under transition and an element of business unit will be introduced. The result will be P&L by country and region, with mature countries having a P&L by business unit (by product category, such as pharmacy). It is unclear how the country P&L and business unit P&L will intertwine for these mature countries.

The factories are organized by technology, with varying levels of specialization depending on the complexity and cost of the production. The result is that there are flows from factories to countries across regions and business units.

The respondent, European head of supply chain management, believes this restructuring will be the vehicle to bring in a more robust S&OP process, one he considers today to be *'embryonic.'* The company has ambitious, inspiring plans for their S&OP process, but we will limit the discussion here to the current, existing process.

The demand planning is done in each country, and within each country for each business unit. The demand planners have a solid line into the regional supply chain management head but maintain a dotted line to the local business unit general manager. The arrangement is described as, *'They report to me but they are at the service of the BU. I would say there is a dotted line and I do encourage that they are physically with the people of the BU to capture the business intelligence and other non-structured information.'*

Interestingly, this structure has been newly implemented. *'It used to be that the demand planners were dotted line to me and solid line to the general manager and we are changing that, reversing it. Because today the business is always too optimistic. Commercial people are always in a mindset that they will always make their targets.'* In direct response to demand plan bias on the part of the business unit, this company felt stronger supply chain management ownership of the S&OP process was required.

This was done as the supply chain management is seen as a more neutral actor in predicting demand. Sales and general management are very reluctant to admit that the budget number will not be reached. *'They can't recognize and interpret the weak signals that would indicate a*

product line in decay. If we observe that the business is not where we thought it would be, the lower the new baseline the higher they increase the forecasts for the end of the year. They say it's too early to declare we won't make the budget. So in fact what is the forecast for the year to go, it is budget less year to date divided by the months left in the year.'

Going further to explain this conviction of the supply chain management authority over demand planning, *'When I see a country gets its forecast wrong, it's not because they've made an error. It's because they are manipulating it. I know it's not what I am going to sell, but I say it to get something else.'*

The company does not yet monetize the demand plan in order to compare to a financial trend. They are striving to do this, but are encountering master data issues on pricing that are undermining their efforts.

The respondent shared country level forecasts and their comparison with actual sales data. It is striking how stable the forecasts are and how close they are in actual sales as compared to other industries. This is likely due to the longer, more stable, less promotional lifecycles of pharmaceutical products compared to consumer goods or other industries. When it was suggested that perhaps the demand planning could be centralized in this stable context, the response was clear: *'The conclusion I've come to is that the forecasting must be done at the level where the business decisions are made and the business decisions are country based.'*

He went on to discuss the impacts of local commercial efforts on the decision to keep demand planning localized: *'I don't believe (consultants) when they say do a baseline at the European level and market intelligence locally. I can't see how we are going to get it to reconcile. How are we going to have a demand planner at the European level who will say I put a baseline in the system and afterwards you do your thing?'*

There is no supply chain planning function that mediates between the country business units and the factories. Production planning and supply planning is done at each factory in parallel, and communication is done directly between each market and each factory with no intermediary. However, each country decides the target stocks the factories must respect. *'Each country defines for each SKU a minimum stock and a maximum stock. And the job of every factory is stay within the min and the max.'*

The factories have a completely separate hierarchy to the business units, one that follows technologies and geography. The result is a complex relationship of technology structure and business structure interactions. The supply chain management group reports into a broader operations group that includes the factories. The supply chain management group maintains a dotted line over the production planning. As explained by the respondent when describing the production planners: *'They work solid line to the factory manager, dotted line to me. But the matrix aspect is important, because no business unit has its own factories. That's not easy. I have one business unit that is sourced from 3 divisions according to the technology. And on top of it all the divisions have a geographic dimension to them.'*

Each factory has its own P&L and the factory manager performance is judged in large part through it. The regional supply chain management maintains service and inventory performance for each link of factory and market to ensure no extreme deviations in supply chain performance occur due to this incentive structure. In the same way, projected overall and obsolete inventory are monitored by the supply chain management. The dotted line link with the production planners in the factory enables the supply chain management to take deep dives and push for remedies.

With solid line authority over localized demand planning and dotted line authority over production planning, this company is a representative Weak Bi-Directional S&OP Owner.

Strong Bi-Direction S&OP Owner

The Strong Bi-Directional S&OP Owner company is a large multinational company with between 20 and 30 billion USD in annual revenues. The company is headquartered in the United States and employs less than 50,000 people in about 80 countries. There are over 30 manufacturing sites. They are a significant global player in consumer paper products like wipes and tissues. (source company website). It is company 16 on Table 5.

The S&OP governance mapping for the Strong Bi-Directional S&OP Owner company is below in Figure 13.

			Core S&OP Functions																	
			Manufacturing Supply Chain			International S&OP			Supply Planning			Demand Planning								
Company Profile			Production Scheduling	Material Supply	Production Planning	Demand Control	Workload/Allocation	Inventory Control	Affiliate Supply Management	Affiliate Check Level	Affiliate Check Level	Detailed Forecast	Launch Forecast	Point Forecast	Forecast Process	Demand Planning Level	Willful Supply/Demand Imbalance	Willful Demand Plan Manipulation	One Set of Numbers	
Company 7	Consumer Goods	No											GM	S	M		Market	No	No	No

Operations is considered as all industrial activities that are not always classed as Supply Chain: Production/Manufacturing, Quality, Sourcing

F/M/S/GM – Finance, Marketing, Sales, General Management

Solid Supply Chain line with no dotted line

Solid Supply Chain line with non-Operations dotted line (F/M/S/GM)

Solid Supply Chain line with Operations dotted line

Dotted Supply Chain line with non-Operations solid line (F/M/S/GM)

Dotted Supply Chain line with Operations solid line

No Supply Chain line with Operations solid line

No Supply Chain or Operations dotted or solid line (F/M/S/GM)

Figure 13- Strong Bi-Directional S&OP Owner Company S&OP Governance Mapping

The Strong Bi-Directional S&OP Owner company has a hybrid organization of regional business and global product groups. The business units of sales and marketing are in the regional structure, while the supply chain management is a global structure reporting to the global product group organization. Other than exceptions at the margins, production is regional but the factories produce for multiple product groups. The manufacturing plants report into a global manufacturing organization with a dotted line to the region within which they are situated.

The respondent describing the company is the head of S&OP for North America region. She describes the demand planning organization as sitting within the product groups at the

market level, supporting the business unit general manager, what they call a 'P&L Owner'.

The demand planners have a solid line into the supply chain management group at the regional level, but a dotted line into the general manager. The respondent clearly positioned the general manager as the owner of the demand plan, however. The demand planners are accountable for the demand planning process, but sales and marketing are independently providing promotional and launch forecasts to the demand planners.

The company monetizes the demand plan and compares it to the financial plan in a formal fashion at each planning cycle. Interestingly, the finance group manages the monetization, as it is seen as something outside the purview and knowledge set of the demand planners:

'Demand planners do not have credibility when it comes to the dollars so what we did is finance owns the dollarization, they own the talking about it in the demand review ... we have finance doing all of that in order to lend the credibility of that being a good number.' This approach has kept general managers from sidetracking demand reviews by calling into question dollarized values coming from a non-finance team.

The gaps are explored and understood, but there is no process to align the demand and financial plans. This is explained by the respondent as a lack of credibility in the financial planning process, *'We have a tendency to be very optimistic. So it is hard to come off of financial numbers at times. We see we are coming in at 10, we forecasted at 11, but we really think 11 is going to come in. That's really where we have an opportunity as an S&OP process.'*

In her view, the S&OP process is slowly progressing and becoming more mature. *'In the past our marketing and sales folks have thought we just have inventory there and we're trying to really educate them to say no we don't have inventory there all the time, if it's not in the demand plan we're not producing to it.'* This evolution has, she believes, made demand plan manipulation an obsolete practice at the company.

Upstream in manufacturing, the production planners are part of the regional S&OP team, deciding on the production plan on behalf of the factories. The shop floor scheduling, on a much shorter tactical horizon, works for the factory manager, with a dotted line to the S&OP planners in the supply chain management group at the regional level. She explained that the factory managers are not on their own P&L, and it is not in the mindset of the company for the factory managers to prioritize their cost of goods over supply chain management interests. On the contrary, in the past there has been behaviour of factories taking service risks in order to lower inventory below a safe threshold at the end of the year. The S&OP governance has now ended that sort of practice.

This company is a Strong Bi-Directional S&OP ownership. There is a supply chain management group positioned in between the factories and the markets with solid line over both demand planning and production planning.

3.3 Discussion: Obtaining S&OP Alignment with S&OP Governance

With the four S&OP governance typologies now established, they can be compared in their extent of S&OP alignment. For each type the percentage of companies achieving horizontal alignment of supply and demand is provided. As a reminder, upstream supply alignment is measured through Willful Supply/Demand Imbalance, downstream demand alignment through Willful Demand Plan Manipulation. The construct of Demand Plan/Financial Plan Alignment indicates how each type succeeds in obtaining alignment between the S&OP process and the overall financial planning of the firm. The 5 companies with linear supply chains are added for comparison purposes. The results are shown in Table 7.

S&OP Alignment by Governance Typology

		Achieve Supply Alignment		Achieve Demand Alignment		Achieve Finance Alignment	
Strong Bidirectional S&OP Owners	5	4	80%	2	40%	0	0%
Weak Bidirectional S&OP Owners	12	10	83%	5	42%	3	25%
Partial S&OP Owners	9	5	56%	1	11%	2	22%
Connectors	1	0	0%	0	0%	0	0%
Linear	5	4	80%	4	80%	1	20%
Achieve Finance Alignment	5	4	80%	3	60%	5	100%

Table 7 – S&OP Alignment by Governance Type

The descriptive data in Table 7 reveals that the type of S&OP governance clearly influences the ability of the S&OP process to obtain horizontal and vertical alignment.

The horizontal alignment of supply shows a marked difference between the two governance types that exert bidirectional authority over the S&OP process. Both Strong Bidirectional S&OP Owners and Weak Bi-Directional S&OP Owners have 4 out of 5 of companies reporting

no willful manipulation of the production plan. This is in contrast with 5 out of 9 companies for Partial S&OP Owners and the lone Connector governance type did not succeed in obtaining alignment. This result should not be considered as a surprise. Most of the companies interviewed had the supply chain management group as one part of a greater operations group that includes production, quality and other technical activities. The consequence of this is that management of production and supply chain, even if separate groups, usually only have to move up one level in the company hierarchy in order to find a common accountable manager. With this proximity of management, it is understandable that there would be little difference between Strong and Weak Bidirectional S&OP Owners.

It's interesting to examine with whom the supply chain function shares authority on the downstream side. 19 of the 27 companies reported having no authority or a shared authority over the demand planning process. Of these 19 companies, the other authority was the general manager of the business entity directly in 17 cases, and for the other 2 cases it was the finance department. No company reported putting the demand planning process under sales or marketing. In the event the general manager was the partial or fully accountable party for the demand planning process, there was a variant of a supply chain manager overseeing the demand planning, often with other logistical functions such as distribution under the same umbrella. In these cases, the distinction between shared authority or not is whether this supply chain manager has a hierarchal reporting authority to a centralized supply chain management group.

The testimony offered many instances of practitioners validating the approach used to operationalized S&OP alignment. One supply chain director of a major industrial group, in describing willful demand manipulation: *“If the customer is rescheduling the contract because the civil work is not ready, because another supplier is not ready, because they don’t have the financing, then the guys in the systems Business Unit won’t always tell the product Business Unit of the change ... we have an aversion to risk, and if the products arrive early then at least we are safe. So they can bring products early then it reduces the risk of delivering late to the final customer. So they don’t always tell the supply units about the change in schedule”.*

This lack of transparency is matched by a willful supply/demand imbalance from upstream actors:

“And on the other side the product guys ... they find that they have a best slot in their plants for productions. It’s quite early but that help reducing the under absorption of the heads in the plants, so they would product early, recognize the revenue, and that sits somewhere in the inventory ... they have the revenue, they have the profit, so they are happy. These are just a couple examples of bad behaviour.”

A pharmaceutical supply chain director offered another description of the same problematic, *“One of the very strong drivers of accountability of a site director of manufacturing site is to recover the costs for their site. That then drives some suboptimal behaviours because for example it would lead them to create more inventory and put more volume through the*

factory. But if it doesn't match up to a demand forecast then you've got a problem with both inventory and potentially with write-offs."

Looking to the multi-functional downstream demand alignment the result is very similar, at least in terms of trend. The Strong and Weak Bidirectional S&OP Owner governance typologies are much more successful than the Partial S&OP governance type in exerting authority over the S&OP process. However, the scale is much different. The success of obtaining S&OP demand alignment is only about half of that for upstream production alignment, and even less than half for the Partial S&OP Owners. This is also consistent with intuition. As mentioned in the introduction, the conceptualization and implementation of S&OP is relatively new. This is especially true when looking at the multi-functional demand alignment. The bulk of the literature deals with aligning supply with demand, focusing on capacity management and supply balancing. There is less focus on the aligning of demand with the other multi-functional actors.

One implication of this is that companies are less experienced and further along in the implementation of the downstream S&OP process and so less proficient. Here governance may play a particularly critical role, as the downstream alignment for multi-nodal supply chains is often occurring in many markets in parallel. Even with an S&OP governance that enables a central supply chain management group to influence the process, the effects of distance take their toll. Many companies described the downstream portion of their S&OP process as something novel or recently implemented. They reported difficulties in wresting

the remnants of the previous demand planning processes from their owners who remain in place and may resist the change. This combination of a less mature process, replacing an archaic method, battling entrenched lines of ownership over greater distances helps explain the relative lack of alignment in downstream multi-functional alignment.

The method used to identify misalignment was strongly endorsed by several companies through their testimony. Decrying the multiplicity of demand plans at his company, a major consumer goods firm, one supply chain director told us *“Here we are still in as many versions of the truth as there are departments.”*

Another supply chain director, working for a one of the world’s largest toy companies, described how S&OP governance has been key for them in removing willful manipulation, *“We talked about bias and we have seen bias in our company in the past, considerable bias in the company in the past. If you have the demand planning organization sitting in the sales side, you really don’t have any consideration of the supply chain planning discipline. It will be very much a sales planning target exercise. If you have it in marketing it will be a different situation. You’ll be safeguarding your properties, your franchises and so on and not be willing to see a clearer picture, an objective view. If you put it in the operations organization you have those necessarily vested interests being biased in one direction or the other. It’s more of a neutral ground.”*

Another example of the S&OP distortions created willfully was described by the global head of supply chain policy at a major pharmaceutical company, referring to local general managers responsible for demand planning, *“Their primary worry is more about availability. And actually that’s a bigger sin than inventory at the moment because it’s sort of set up for them. People will consciously make wrong decisions. I’ve had senior leaders saying well I’m going to put in a higher forecast and I know the supply chain [management] hubs are putting in higher forecasts and augmenting them because they are trying to secure supply. People are making conscious decisions to do this.”*

This suggested explanation is consistent with the findings for the five companies with linear supply chains. 4 out of the 5 of these companies succeed in horizontal or multi-functional alignment. The absence of the challenge of having to exert authority over distance into several markets reveals itself in the greater levels of obtaining the alignment objectives. One would expect that for multi-nodal companies that are much smaller in scale, the difficulties in reaching alignment are less burdensome and closer to those of linear companies. Smaller companies are often less encumbered by the formalities of hierarchy and the actors may feel more compelled to be accountable to their colleagues.

One supply chain director at a smaller multi-nodal company with only two factories servicing a global operation stated that he believed there was no need to be concerned about willful demand manipulation because the structure was not big enough for this sort of behaviour to

go unanswered, *“It works well because we are small. There’s no structural mechanism here, it’s because people know each other.”*

Unsurprisingly, the lone Connector company has not succeeded in aligning their supply chain management along either dimension, further underscoring the role of S&OP governance in the achievement of its objectives.

Important to note are the results of companies that achieve financial alignment. These are companies that have a set policy of aligning their demand plan resulting from the S&OP process with the company’s financial planning activities. Only 5 companies reported that this policy was in place. These 5 companies had markedly better success in achieving both horizontal supply alignment (4) and multi-functional alignment (3). These results almost match that of a simpler linear supply chain configuration. It clearly suggests that a clear policy of aligning financial and demand planning is at least as critical as governance in achieving both axes of S&OP alignment.

There appears to be a link between the governance type and the implementation of this policy. Of the 5 companies with demand and financial plan alignment, 4 of them have either Strong or Weak Bidirectional S&OP Owner typologies. The companies interviewed seem to implicitly recognize this. In addition to the 5 companies that have this policy in place, an additional 11 companies stated that they *intend* to implement a policy of aligning demand

and financial plans. Combined with the 5 companies already having such a policy that makes 16 companies of 27 of companies interviewed moving in this direction.

This would appear to identify a clear trend in S&OP by practitioners, one that is consistent with the practitioner literature espousing the importance of 'one set of numbers' as the key metric of S&OP success (Lapide 2007). This is best described by the global head of supply chain management of a European-based pharmaceutical company, referring to the needs for an alignment policy with financial planning activities: *"We want to collaborate more with the other stakeholders and to come with an integrated set of numbers to simplify the forecasting in the organization today. Because today you have finance asking for a forecast on a regular basis, we do ask for a forecast every month and this is totally disconnected today. And so you have big discrepancies sometimes and though we try to improve on that we want to work on analyzing our numbers much more so right now we are working with finance to coordinate that much better and simplify our processes. Because as we speak we are trying to improve this for the future."*

This same supply chain director described how he sees an obligatory financial alignment inhibiting willful demand manipulation, *"I hope to fight that [manipulation] by aligning my forecast with the financial forecast and there will be questions. You are asking so much and you are selling 20% below. What do you not understand in your market?"*

This example expresses clearly the operational understanding of supply chain management practitioners that the key to gain transparency and engagement from other functions in the S&OP process is through financial alignment. This intuition, shared among many respondents and borne out in the analysis of the data, forms the basis for the furthering of S&OP conceptualization.

Summary

This section presented and discussed the data collected. To summarize briefly:

After culling, 27 companies had their S&OP governance mapped out in detail in order to determine to what extent the supply chain management had responsibility over upstream (through production planning) and downstream (through demand planning process) responsibility. The result of this mapping was an S&OP governance typology comprised of four types: Strong S&OP Bi-Direction Owner, Weak Bi-Directional S&OP Owner, Partial S&OP Owner, and Connector.

These four types were then shown to have a clear influence on the ability of the S&OP process to achieve alignment in both multi-functional and horizontal dimensions. The notable importance of a policy of aligning the demand plan and financial plan was exposed and highlighted.

Lastly, the difference in nature of the four S&OP governance types was illustrated through a closer look at an example company for each of the four types.

4. FURTHERING S&OP CONCEPTUALIZATION

This section is an exploration of an avenue for furthering S&OP conceptualization outside of the sphere of supply chain management, and into management control.

First an examination of some key concepts in management control that have clear links to S&OP are reviewed and discussed. This is followed by a detailed exploration of a framework for understanding the influences accounting objects have on organizations that - it will be argued - has strong relevance to S&OP conceptualization.

This is followed by a discussion of the limitations and risks of using this approach of linking S&OP to accounting objects and organizations too strongly.

4.1 Looking Outside of S&OP Literature Towards Management Control

Up to this point, we have looked at the S&OP process uniquely as a supply chain management concept. But revisiting some of the key elements, as well as some of the results of the analysis leads to a different way of looking at S&OP. This survey on the S&OP governance configurations points to the challenges faced by multi-nodal supply chains. Multi-nodal supply chains have more difficulty in obtaining alignment than linear supply chains, but this difficulty is mitigated by the implementation of governance models that extend into both the supply activities and demand planning activities. The results point to the importance of S&OP alignment with the financial planning process. Indeed this link may be as – if not more – important than the S&OP governance type in place.

However this research rests in an exploratory approach. The insights suggested by this research invite further efforts into S&OP conceptualization. We have described S&OP as a process that strives to obtain alignment between different functional actors within an entity, and also alignment from end-to-end in the supply chain. The components of S&OP are made up of different stages of planning, notably production planning and demand planning, which played prominent roles in the data analysis of the field research. The field research shed light on the interesting dynamic that plans were often manipulated by actors to advance their own agendas. This manipulation undermines the transparency and credibility of the S&OP process, thwarts alignment and erodes the effectiveness of S&OP. The data analysis revealed that creating supply chain management structures that spanned the supply chain helped mitigate

the willful manipulation of the process. And importantly we saw that a firm policy of aligning the demand plans and the financial plans was even more effective at controlling this behaviour.

The strong links of S&OP alignment to financial budgeting and planning provide a direction to a further conceptualization of S&OP, one that leads towards management control. If the way forward for successful S&OP alignment is intimately linked to the processes in place used to control and predict the financial performance of the firm, then there may be a key contribution to be made by looking outside operations research and linking S&OP to the field of management control to understand and describe more deeply the seemingly apparent relationship revealed here. This potential avenue is bolstered by the testimony that validated the operationalization of S&OP. The examples offered by the interviewed companies on willful S&OP distortions centered on financial performance. The performance was either real as captured in the income statement, or as a method of adjudication (that is to say, judgement of performance) through cost controlling performance measures.

This insight nudges S&OP into the domain of management control.

Management control can be defined as a process whereby a company sets performance objectives and strive to achieve them over time. It is a method for managing the performance of the company (Giraud, Zarlowski, Saulpic, Lorain, Fourcade and Morales 2011).

Management control is seemingly intricately linked to the success or failure of S&OP through

both alignment with financial planning activities and how the management control techniques drive behaviours in the S&OP process. Management control offers insights into why supply chain management structures and alignment with financial plans have positive impacts on S&OP performance.

Management control has in the past attempted to capture and integrate into its field new innovations in operations management. Hansen and Mouritsen examined the impacts of key manufacturing innovations like Total Quality Management, Just-In-Time and Automation on Management accounting (Hansen and Mouritsen 2006). They recognized that operations management innovations can begin to cross functional boundaries. This change, they argued, created challenges for standard cost accounting and organizational accountability, among other impacts.

While Hansen and Moritsen focused strictly on operations management innovations within a production facility, they point out that these innovations were due to production specialisation (Hansen and Mouritsen 2006). S&OP is similar, in that – as is argued here – it is the multi-nodal configurations brought about by production specialisation that create the unique challenges to supply chain planning processes that exist in multinational companies today.

The idea of planning processes acting as a lever with which to control the firm performance is one of the pillars of management control (Anthony 1965). Planning can be done over

different horizon, from strategic horizons of many years to a tactical horizon of one year. This tactical plan is commonly known as the budget plan. The budget plan sets out to capture the firm's objectives and express the revenues, margins and associated resources that are needed to accomplish the objectives underlying the budget plan.

S&OP and Business Planning

The first link between S&OP and management control lies in this first pillar of the planning process as a performance control lever. The key S&OP idea of 'one set of numbers' in the multi-functional axis is referring in large part to the objective of alignment between the demand plan and the financial plan. The financial plan meant here is the budget plan as understood in Management Control. In other words, the success of the S&OP endeavour lies in the ability of the process to connect the demand plan, an inherently supply chain management construct, to the budget plan, an inherently management control construct.

It is worth pointing out that this holds true even though budgets are generally only done once each year. When referred to so far here, financial plans have enveloped not only annual budgets but also the re-actualized trends done at various times during the year depending on a company's particular policy. Re-actualized trends are really another way of expressing a variance to a budget plan. A change in expectation in top line or bottom line of a P&L is seen and understood as a variance to expectations captured in the budget plan (Sivabalan, Booth, Malmi and Brown 2009). The S&OP objective of multi-functional alignment with financial

plans can be said differently as the demand plan and financial plan must agree on the changes in expectation of the forward performance of the company.

One of the primary reasons management control stresses the importance of planning is that it plays a crucial role of anticipation (Barrett and Fraser 1977). The planning process is meant to ensure that the correct resources are allocated to achieve the agreed upon objectives or if the objectives themselves need to be reassessed. This description of the benefits of planning is easily used to describe the horizontal alignment objective of S&OP. Recalling that the horizontal alignment of S&OP seeks to balance supply and demand, to the extent that the production can respond, production resources should be properly allocated to matching the expressed demand, and alternate scenarios are considered should the need arise. If the demand plan is aligned with the financial plan, then the horizontal alignment can be seen as a process to ensure that the production resources are adequate to meet the business objectives. The horizontal S&OP is now, in a way, a process to ensure the anticipation objective of planning in management control is being met.

S&OP, Supply Chain Governance and Management Control

Management control literature describes different principles at play that impact how to delineate spheres of responsibility. A closer look at these principles reveals a connection with the analysis done here on the impacts of supply chain governance structures when the company is a multi-nodal configuration.

Management control literature points out that large companies need a clear structure through which to delegate decision making (Henri 2006). In a multi-nodal configuration, this structure would require a certain amount of delegation of authority. But each company must decide what the structure will look like and what authority will be delegated. From that point, performance control systems can be put into place.

If performance objectives were set and results tracked only at a central level, then local managers would be able to argue that they have no visibility into what they are expected to do and how well they are performing. So at least some level of delegation of authority must be put into place.

A key principle to start from is the principle of demarcation (Giraud, Zarlowski, Saulpic, Lorain, Fourcade and Morales 2011). The perimeter of the territory over which a local manager has the responsibility to take decisions as defined by the company should be clear and understood by all.

The territory that is defined by this demarcation can then be seen as a responsibility center (Merchant and Van der Stede 2007). For example if the demarcation is a local subsidiary run by a general manager, then the general manager is responsible for his performance of the local market. With the responsibility center in place, performance measurement systems can be implemented.

The performance measurement systems should respect certain principles in order to be successful. One of them, as will be shown, is of particular importance to S&OP. It is the idea of the controllability principle (Antle and Demski 1988). The controllability principle expresses the notion that the costs and revenue used to attribute performance in the responsibility centre should be under the control of the general manager of the responsibility center (Antle and Demski 1988).

The connection to S&OP in a multi-nodal configuration starts to become clear. A company in a multi-nodal configuration quickly encounters difficulties in applying the controllability principle as concerns supply chain management, and the difficulties are significant. The general manager of the local entity does not control production, as the sourcing is done from factories outside the responsibility center.

This has impacts on costs, of course, as the general manager is subjected to the costs from the factory according to allocation policies that may or may not be considered just and adequate. The factories must have their own responsibility centers, which by definition cannot be the same as the many local entities they supply. Regardless of how the responsibility centers are demarcated, there is a conflict between the idea of controllability for a factory and controllability for a local entity. The supply chain planning done as part of the S&OP horizontal alignment process forcibly crosses over many responsibility centers. This hurdle of working across of responsibility centers on an ongoing operational, tactical basis is, I believe, a

challenge unique to S&OP. No other management process is asked to do this in a way that is so critical to successful performance.

To see why it is so critical to the successful execution of S&OP, it is worthwhile to return to the two key constructs used earlier in the analysis: production planning and demand planning. These two constructs were used to identify the span of control of the S&OP governance, and the governance was shown to be a key to successful alignment. Production planning is a key step done to ensure that resources are deployed in such a way as to match supply and demand. Demand Planning is a key step to ensure that the demand expressed is aligned with the current business vision moving forward. In other words, the key, critical steps in S&OP are necessarily and forcibly occurring in two different responsibility centers with two different visions of the controllability principle. This, as will be shown, helps in explaining why S&OP governance has a demonstrated relationship to S&OP performance.

A closer look at the demand plan helps illustrate this important point. As discussed, the variances to the budget plan are in fact a way to measure performance at the local level. The general manager will be judged in large part by their ability to deliver the budget plan as agreed upon. If the variance to the budget plan must be aligned with the demand plan, then that is a way of saying that the process of elaborating the demand plan impacts the variance to the budget plan and so impacts in a direct and clear way the performance measurement of the general manager.

Using an understandable application of the controllability principle, a general manager would then want to exert strong influence over the elaboration of the demand plan. Yet as we saw, the elaboration of the demand plan is a key element of the S&OP process, which is understood to be a supply chain management process. This helps explain why different shared governances were observed for demand planning between supply chain management and local general management. The supply chain function is held as responsible for demand planning and has performance measures directly associated with the quality of the demand plan, and others that are indirectly associated, such service and working capital. The general manager, through the link between the demand plan and budget plan, is compelled to see the demand plan as intrinsic to his or her performance evaluation.

A similar reflection is worthwhile for production planning. The allocation of resources for production has a significant impact on the economic performance of a factory. Decision making impact examples include whether to use overtime, less-efficient resources or temporary labour. Many bottlenecks are with suppliers of materials, so some risks may be taken to mobilize resources in anticipation of available materials that may not materialize. It is understandable that a factory manager who is being evaluated on the ability of the factory to respect its budget plan to want to have a certain level of influence on these decisions. This would be a sensible application of the controllability principle. Yet as we saw, the definition of the production plan is a key element of the S&OP process, which again is understood to be a supply chain management process. This contributes to the explanation as to why different shared governances were observed for production planning between the supply chain

function and factory management. Production planning is both under supply chain authority, as part of the S&OP process, and a strong influencer of the factory manager's performance as explained by the controllability principle. The supply chain function is held as responsible for production planning and has performance measures directly associated with the quality of the production plan, and others that are indirectly associated, such service and working capital. The factory manager, through the link between the production plan and the factory economic performance, is compelled to see the demand plan as intrinsic to his or her performance evaluation.

S&OP and Budget Plan Alignment

The mechanism of aligning the demand plan and budget plan (and its variances) can now be seen in large part as a management control device used to regulate the performance of the local entity.

There is a principle in management control known as the contractual principle (Merchant and Van der Stede 2007). The contractual principle states that a manager has negotiated and agreed upon the performance measures and levels that will be used for evaluation. It follows from this that the budget plan is a firm commitment on the part of the general manager. If this is the case, there is a strong temptation on the part of the general manager to understate the potential performance of the local entity in terms of revenue. In this way the general manager has increased the chances that the expected performance will be met (Dearden

1987). This dynamic is known as budgetary slack (Merchant 1985) wherein managers build in breathing space and pad performance expectation levels. Or put more bluntly, general managers try to 'game' the budget planning process.

Obliging an alignment between the budget plan and the demand plan presents a strong, tangible disincentive to this sort of behaviour. The demand is that start of the S&OP planning process and leads directly to production planning, which of course generates the inventory that is used for sales. If the budget plan is artificially low, then through the alignment the demand plan is artificially low, so the production planning is artificially low and there will be insufficient inventory for the general manager to satisfy the true, higher, demand that was willfully not used in the budget planning process. The results will be poor service levels, which are certainly seen as a measure of supply chain performance.

Seen from the center, the alignment of the demand plan and the budget plan is a useful tool to regulate the budget planning process and exert control over the local entity's behaviour in the responsibility center. It creates a limit on the agency of the local general manager.

From the perspective of the supply chain management, the disincentive created by the alignment of the demand plan and the budget plan leads directly to more transparency and less manipulation of demand plan. This is borne out by the data shown in the field research as will be shown.

There is another direction that budget plans can be gamed, however. It is the case of general managers artificially increasing the demand plan in order to ensure that inventory is available. Should the general manager doubt the ability of the supply chain to make available inventory needed to satisfy the commitments made in the budget plan, it may become very tempting to 'game' the demand plan in the opposite direction as described earlier, and increase the demand plan as compared to the budget plan. The result will be that there is surplus inventory in the supply chain. However, the impacts in terms of performance measures will likely not fall to the general manager of the local entity. Management control helps us understand why this is the case in multi-nodal configurations.

It is entirely likely that the surplus inventory will not sit on the balance sheet of the local entity. It may be in a different local entity that houses the factory, or the factory itself. Either way, it is a different responsibility center. In almost all companies, working capital - of which inventory is an important part - is seen as a supply chain management responsibility. Yet as we saw earlier that in multi-nodal configuration the supply chain spans many responsibility centers and has control over none of them, so this is certainly a dilemma with respect to the controllability principle. The local general manager who willfully manipulated the demand plan does not feel the consequences in terms of inventory that stem from this action. It is the supply chain function that does.

However, if the demand plan is aligned with the budget plan, the general manager has a strong disincentive to behave in this way. The reason is that by artificially inflating the

demand plan, the alignment process will also inflate the variances to the budget plan, locking the general manager into higher commitments.

When seen from these two different perspectives, the alignment of the demand plan and the budget plan (and its variances) is beneficial to both the supply chain management - in terms of the S&OP process - and for the central accounting function in terms of management control.

As will be explored later, this approach only holds true if the budget planning process is seen as a firm commitment. Budget plans can play different roles in different companies (Libby and Lindsay 2010). They can serve as the foundation for cost of goods standards, allocation of investments and strategic priority setting. One role may be as a purely managerial issue, where the budget is an ambitious, aspirational exercise (Lyne 1988). In this case, it is not meant to be a firm commitment, but rather a high target that neither the manager nor his or her superiors believe can be reached but find useful to articulate as a motivational goal. It would not be in the interests of the supply chain management to create inventory to match this goal and aligning the demand plan and budget plan would be unwise in this case.

S&OP and Collaboration in the Budget Plan

Management control literature acknowledges that the incentive function in management control can act as a barrier to effective collaboration between actors horizontally (Hansen and

Van der Stede 2004). There is a risk that it can lead to compartmentalisation wherein each responsibility center focuses uniquely on its performance.

It can be argued that this risk is magnified when in multi-nodal supply chains. If the supply chain is linear, then the factory is more directly linked to the general manager of the local entity and falls under his or her responsibility center. However, in multi-nodal supply chains the factories and the local entities are by definition in different responsibility centers. This creates the strong incentives towards everyone-for-themselves mentality described earlier.

This dynamic is only exacerbated by the inherent complexity of large supply chains. There is a multitude of reasons why service might be disrupted or inventory too high. The application of management control to supply chain management usually has the consequence of the supply chain function spending a great deal of their time justifying why compartmentalized behaviour by those outside their influence led to the results in question. This again helps explain the tendency towards Strong Bi-Directional Ownership and Weak Bi-Directional Ownership seen in the field research: if the supply chain function must constantly account for service or inventory results due to the behaviour of the production planning or demand planning it is understandable that there be a desire to extend the supply chain function to cover these areas.

To make the connection to S&OP in multi-nodal supply chains as clear as possible, we can look at the figure used earlier to illustrate the 2 dimensional nature of S&OP in multi-nodal supply

chains, now with the concept of responsibility centers layered on, as seen in Figure 14. These responsibility centers, and all that they entail, slice the supply chain activities that the S&OP must plan into a web of controllability conflicts.

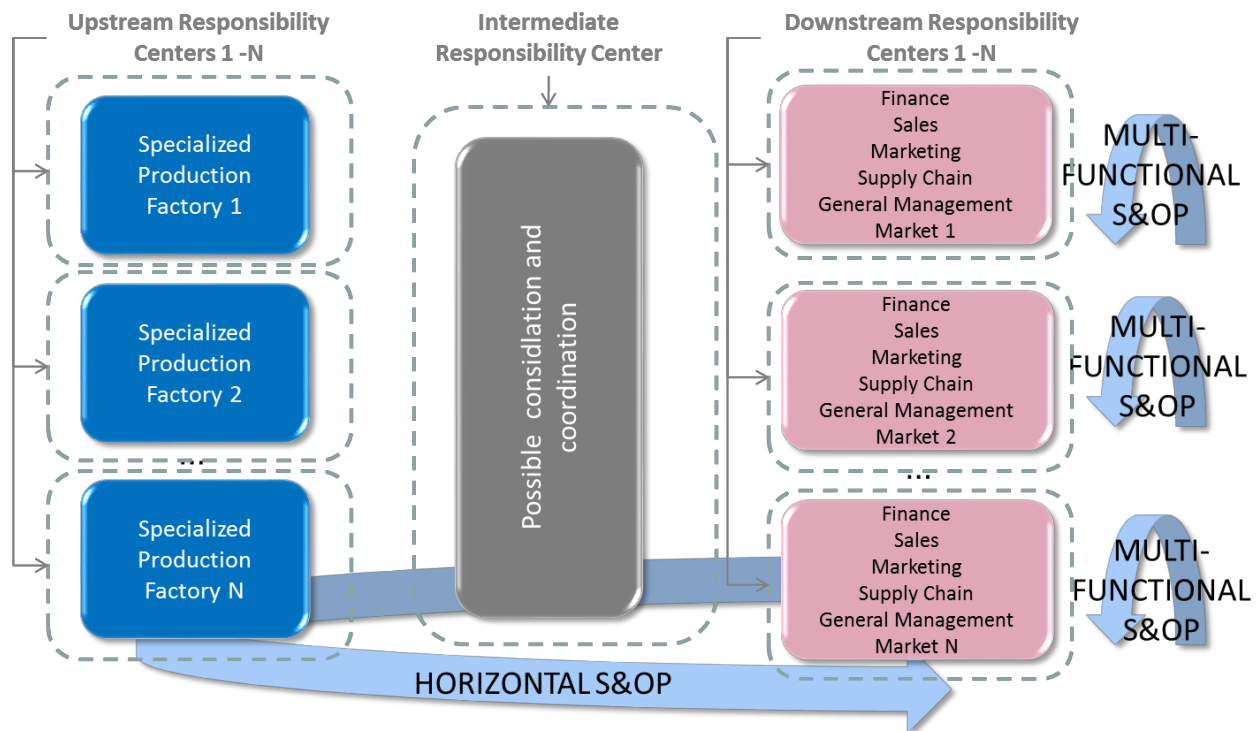


Figure 14 - Multi-nodal S&OP With Responsibility Centers

The link between S&OP and management control seems to be clear. Clear enough, in fact, that the theoretical framework with which to continue the analysis must be expanded to recognize this new insight. This thesis should now be positioned in an overlap between S&OP (and its related constructs) and a subsection of management control, as shown in Figure 15, allowing the completion of the conceptual and theoretical framework shown in the literature review. It is important to stress that this overlap is really only on the discussed concepts in

management control of responsibility centers, controllability principle and business planning. Management control is a broad, vast field and this research has no pretensions of fully exploring it in this thesis.

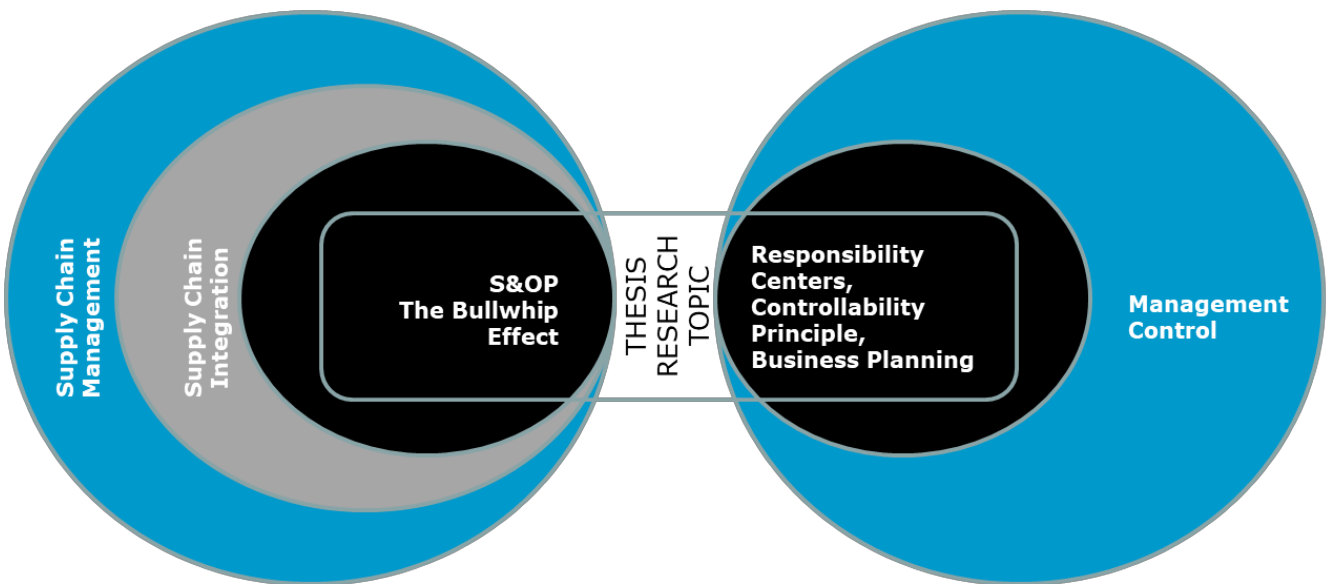


Figure 15 - Broadened Conceptual and Theoretical Framework

The next step is to find a useful framework that can be applied as a lens through which to capture this link and further S&OP conceptualization.

4.2 *The Miller/Power Framework and S&OP: A Way Forward*

Being at the crossroads of Supply Chain Management and Management Control, it is reasonable to look beyond Supply Chain Management for insights into furthering the conceptualization of S&OP and towards a path to answering the research questions.

Within the Accounting and Management Control literature a recent and seminal paper (Miller and Power 2013) proposes a framework to develop the understanding of accounting practices and their impacts in organizations. This framework helps place the management control principles described earlier by identifying four ways in which accounting and accounting objects structure the activities of a company.

At the heart of the Miller/Power framework is the idea that accounting is a productive force that drives and shapes the economic and organizational life of the firm. The ambitions and values of the company are inextricably linked to the notions and calculations of accounting. Going further, accounting more than any other force influences the constitution of economic spaces and entities and mediates ideas and exchanges within and between these territories. The very ways that companies evaluate and value performance and the actors see and appreciate their roles within the company are shaped in large part by accounting.

Their insight is that accounting objects – which they define as costing, budgeting, planning, auditing, financial management, and financial reporting (Miller and Power 2013) – are a force of economic life in a firm. This force is manifested in four ways: *Territorialization*, *Mediation*, *Adjudication* and *Subjectivization*. The clear link between S&OP alignment and financial planning invites an examination of the influence of accounting activities on S&OP. Drawing upon the Miller/Power framework and its four themes to S&OP, we can further its conceptualization and begin to formulate theoretical answers to the research questions.

Each of the four manifestations of the potential influence of accounting on S&OP will be examined, always keeping in mind the dual alignment of objectives of S&OP: horizontally in an end-to-end supply chain management and multi-functionally within each market.

4.3 Territorialization

Miller/Power put forward that organizational units within firms are constituted as economic entities. The entities are then judged on their performance in success or failure. This insight provides a powerful framework with which to view S&OP in the multi-nodal world. If we focus attention of the multi-functional S&OP alignment, the research program showed that this may occur at a local market level, a regional level or global level. It may be even further sliced along business unit lines. As one respondent put it *“there are P&Ls everywhere. We have P&Ls in the plants, we have P&Ls in what we call product groups, which are in between the 23 business units and the plants. We have P&Ls in the business units and so on. There’s a tendency to say it’s my P&L and I make the decisions.”* Where here and from this point P&L refers to the profit and loss sheet, or the income statement.

Keeping in mind that the key deliverable of multi-functional alignment is 'one set of numbers' that drive the commercial, financial and demand plans, practitioners have recognized this alignment as fundamental to the success of S&OP (Milliken 2008). The definition of S&OP as balancing supply and demand starts with a financial plan (in the form of budgets and trends) that general management has committed to deliver being coherent with the demand plan that drives the upstream supply chain activities.

If there is a gap between the demand plan and financial/sales plans, there is an expected impact on firm performance. If the demand plan is smaller than the financial/sales plans, the

results are unfulfilled orders and dissatisfied customers, creating risks to the short and long term commercial success of the firm. If the demand plan is higher than the financial/sales plans, the cost of products may rise due to unnecessary expediting or overtime in the factory. Another consequence may be that excess inventory will create depreciation provisions.

These costs have direct and indirect impacts on the profitability of the firm. More specifically, these impacts are felt by the general management of the *entity in question*, whose territory is defined by the P&L they are responsible for as suggested by Miller/Power. The risk of S&OP misalignment is seen on the accounting objects (here the P&L or the balance sheet) of the management entity. This creates a strong incentive for a general manager to obtain the S&OP alignment between the demand plan that will drive the supply for his entity and the financial plan (itself an accounting object) the entity has committed to. If the territory of the S&OP process is different than the territory of the financial plan, this alignment no longer has any sense. The consequences on the P&L and balance sheet accounting objects no longer have a clear link to the success or failure of the S&OP process. This means the general manager will not feel wholly accountable for either the S&OP process or its impacts on the financial performance of the entity.

But this does not - in and of itself - answer the question of why alignment of the demand plan and the financial plan will lead to a more desirable S&OP outcome. For this we can revisit the findings of the research. Only 30% of companies interviewed reported having eliminated willful demand plan manipulation. That means that fully 70% of these large multi-national

firms willfully provide demand plans that do not represent the latest perception of the forward financial performance of the firm. This is despite the impacts to the P&L as described above. This warrants further reflection.

One possibility is that the cost impacts of demand misalignment are not borne by the P&L territory that generates them. The costs are a form of economic externality, carried by a factory that sits in another market and on another P&L. This is a plausible explanation that is consistent with the difference between multi-nodal and linear supply chains. In a linear supply chain there is only one entity and the research showed only 20% of companies having demand manipulation. The implication is that Miller/Power's framework provides a coherent lens with which to explain the behaviour of willful S&OP demand misalignment: the multiplicity of P&L territories created by a multi-nodal supply chain creates the possibility for shifting costs to other actors without direct consequence. Each actor will look out for their own economic interests, working against the very idea of a concerted collaborative supply chain management that shares and places risks at the most optimal location (Lee, Padmanabhan and Whang 2004, Carter, Kaufmann and Michel 2007, Heather Dawn, Janet, Chee Yew, Soroosh Sam and Denyse 2015).

Left to be explained is why the general manager of the P&L of the territory generating the demand plan would want to willfully manipulate the demand plan in the first place.

Experience and the research reveal that it is a desire to protect the short term commercial interests. A lack of confidence by general management in the ability of the supply chain to

properly service customers creates an incentive to artificially increase demand in an effort to secure more inventory (Harrison 2009). In other words, if the general manager has a doubt about whether the supply chain can plan or deliver enough stock, he will instruct his staff to inflate the demand to create a buffer safety stock. This is consistent with another similar behaviour of inflating demand when resources or capacity is scarce, in order to try to game allocations of the scarcity. The downside to this strategy is small since the multi-nodal nature of the supply chain permits him to 'export' the costs outside of his accounting territory.

The testimony in the research and anecdotal observations are laced with examples of companies with multi-nodal supply chains describing the impacts of this dynamic. One consumer goods company estimates that packaging material supply planners spend up to 30% of their time trying to identify which demand plan manipulations generated over procured materials that became obsolete, the goal being to rebill to the guilty P&L territory in a spirit of fairness and justice. One company shared an anecdote of a factory knowingly manufacturing products it knew were not needed in order to avoid being unfairly charged – in their view - for obsolete packaging materials. These behaviours – from experience and observation – are generally not seen in linear supply chains where there is only one P&L and high proximity between upstream and downstream actors. The analysis of the research in the previous chapter cites many quotes that describe these behaviours and their motivations.

This behaviour has a more insidious impact. It generates frustration, mistrust and a culture of blame in a company. This reinforces the idea of P&L as territory and works directly against an

integrated end-to-end supply chain management. Each actor questions the good faith motivations of the other (Grimson and Pyke 2007).

In the face of this observed territorial behaviour, the ambition of S&OP to align the demand plan and the financial plan is a targeted, coherent and logical response. Bearing in mind that we are discussing large, international companies with multi-nodal supply chains, the financial plan represents the commitment of the general manager to the broader corporate hierarchy. Binding the demand plan and the financial plan together is an efficient way to limit manipulation of the demand plan. This can be understood by looking at the two possibilities for manipulation and their consequences when the demand and financial plans are aligned.

The first possibility is that the general manager wishes to have a demand plan that is higher than the envisaged financial plan in order to secure inventory or scarce resources/capacity. If there is a firm, clear policy of multi-functional alignment, then this behaviour obliges an inflation of the reported financial plan. So by inflating the demand plan, the general manager is committing himself to an artificially high, misrepresentative financial plan. This is certainly not a desirable incentive for him and so the S&OP alignment of demand and financial plans acts as a strong dissuader of willful demand manipulation.

The other possibility is that the general manager wishes to understate the financial plan they are committing to with the broader corporate hierarchy. In this eventuality, the linking of the demand plan to the financial plan makes that a strategy fraught with risk for the general

manager. Knowing that the demand plan will generate a supply plan through the S&OP process, the inventory supplied, capacity deployed and material procured will be for an artificially low demand plan. The consequence for the general manager is that if the financial performance ends up being at the level he imagined – that is to say higher than he reported – he knows he may well not have enough inventory to meet the customer orders. The quotes provided in the data analysis reveal many instances of these behaviours.

Taken together, a firm policy of aligning the demand plan resulting from the multi-functional S&OP with the financial plan has two desirable results: less willful demand manipulation and a more reliable, sound financial plan. It's no surprise, then, that 3 out of 5 companies with this firm alignment policy in place have tamped down on willful demand manipulation while only 5 of 22 companies without a firm policy in place can claim to have done the same.

Misalignment of demand and financial plans is a failure to reach one of the understood objectives of the S&OP process. By having consistency between the territory of the S&OP process and the territory of the accounting bodies, the *consequences* of the misalignment and the *alternatives* to obtain alignment are consistent as well. The S&OP process only has a sense if it yields multi-functional alignment, and that alignment is only relevant and achievable if it acts on the same perimeter as the accounting objects in question.

Importantly, in the event there are gaps between the demand plan and the financial/sales plan, the options available to close this gap are only actionable within the managerial

territory of the entity. Either the demand plan is altered or the financial/sales planning is altered until the gap is closed, or the above financial impacts are at risk. Examples of modified financial/sales plans include modified promotional plans, accelerated entry into new customers or changes in customer stock holdings. The territory over which these decisions are made is invariably the same territory of responsibility of the P&L and balance sheet accounting objects.

The implications that can be derived from the Miller/Power become clear. Conceptually, the S&OP process will have more meaning and relevance if its territory is consistent with the firm's accounting object territory. In other words, when the managerial scope defined by the P&L, balance sheet and financial plans is the same as the multi-functional territory of the S&OP process, the S&OP process is more meaningful due to the impact of alignment and the proximity to strategic business decisions. For firms operating in several markets with multiple business units, this enhanced conceptualization is significant.

There is a clear connection to the governance typology results seen in the research. The analysis of the research laid out the finding that having a dotted or solid hierarchical line reporting structure between the demand planner and the general manager yielded markedly better S&OP alignment in demand. This influence from outside the sphere of the general manager contributes to the implementation of the firm S&OP alignment to the financial plan and less demand manipulation by the general manager. In other words the S&OP governance

allows the supply chain function to keep a check on the instincts of general managers to manipulate demand plans and push towards alignment with financial plans.

However, almost all companies interviewed reported that the demand planners were located in proximity to the markets where the business decisions were made, regardless of hierarchical governance structures. This practice expressed by respondents is echoed in practitioner literature (Alexander 2013). This is consistent with the implications of the Miller/Power framework as applied here. The general manager, seeing his managerial territory as being defined by his P&L, would not readily delegate the financial plan to a centralized, remote supply chain management group. Yet this is precisely the consequence of aligning the demand and financial plans should he relinquish influence over demand planning. If demand planning is done centrally outside of his authority, and the demand plan influences the financial plan through the alignment, then the general manager loses authority over the financial plan. The dual reporting structure observed to have success in S&OP alignment works precisely because it allows the alignment of demand and financial plans by not requiring the demand plan to be a uniquely supply chain management deliverable. Since it is aligned with the financial plan, it is forcibly a shared deliverable with the local general manager, otherwise the general manager would be forced to relinquish his authority to define his financial plan, and the financial plan – and by extension the P&L – are the very sorts of accounting objects that define his managerial territory. Practitioners are beginning to take note of this important observation (Charanyan Iyengar 2013).

There is a clear link to be made between this discussion of territorialization and the notion of the controllability principle discussed earlier. The demarcation of the control of the manager can be seen as the territory. The argument here is that the territory is defined by the P&L responsibility of the manager. The manager's natural desire to have control of over the levers of performance in his territory is the driving explanation for the importance of territorialization in S&OP alignment.

There are strong implications of this on mediation within the local market team that will be discussed below.

4.4 Mediation

Miller/Power identifies Mediation as the second force through which accounting can influence organizations. By mediation they refer to a common narrative that constitutes a network and brings diverse actors together in combining their efforts and knowledge towards the shared goals of that common narrative.

Examining the multi-functional S&OP alignment, we can begin to see the utility of understanding the mechanisms for mediation. The foremost challenge to S&OP multi-functional alignment is the active engagement of actors outside the supply chain function (Oliva and Watson 2009). The sales group is accountable for developing and proposing a sales plan, marketing drives decision on catalogue management and product lifecycle, supply chain management on supply and capacity management and finance on construction of the financial plans of budgets and trends (Paiva 2010). To obtain the goal of 'one set of numbers', the S&OP process requires that these actors come to a consensus on one plan that accommodates their individual plans and priorities (Stahl and Stewart Levine 2011). The S&OP process acts a vector to collaboration between sales, marketing, finance and the supply chain management department to product a coherent, aligned joint plan (Oliva and Watson 2011). That aligned plan, the very objective of S&OP, can be seen as the narrative referred to by Miller/Power.

The deliverable of a unique plan that commits all actors creates the dynamic of negotiation, exchange and transparency necessary to integrate all information and concerns (Bower 2005). The different actors each bring unique information to the S&OP process (Mentzer and Moon 2004, Oliva and Watson 2009). Sales may have unique access to customer growth plans, sales ambitions and category strategies (Harwell 2006, McCall 2013). Marketing has insight into the lifecycle and catalogue changes of the product base (O'Leary-Kelly and Flores 2002, Jüttner, Christopher and Godsell 2010). Finance possesses the objectives of top-line growth and margins expected of management. Lastly, the supply chain management understands the constraints and opportunities of operations in meeting all of these ambitions.

By binding all actors to the shared deliverable, the S&OP process goes beyond a purely supply chain management activity and become a force for mediating the agendas of different actors. The possibility for bias and lack of transparency is reduced. Oliva and Watson have provided a detailed case study in the collaborative multi-functional S&OP efforts of a company to drive consensus towards one set of numbers (Oliva and Watson 2009). It is a clear demonstration of the mediation brought by S&OP multi-functional alignment.

However, left unaddressed in this work are the motivation factors that drive all parties towards this consensus and the arbitration process needed when the parties are not aligned. It is here where the S&OP alignment process contributes. By highlighting the consequences of failure to align on financial performance for the territory of the general manager as

described earlier through the territoriality force, it obliges general management to arbitrate in the absence of a consensus (Stahl 2010). This arbitration will invariably be necessary on occasion, and must be binding in order to drive transparency in the sharing of knowledge by all the actors in the mediation process of S&OP.

The supply chain management, as leader of the S&OP process, can only fully participate in this mediation as an actor on the same territory and the same team. Otherwise the mediation may not have the full investment and transparency of all actors, and the S&OP process will fail. Likewise, the general manager will not take ownership over the alignment if the S&OP process is led from outside the territory of the entity and the mediation and the necessary arbitration will be harder to implement. The sponsorship and ownership of the general manager may then serve as a powerful force to encourage the participation and transparency of the other actors (Gallucci 2008) who may otherwise view the S&OP process as a purely supply chain management function and not an imperative for them (Vincent 2014). This is a non-negligible point, as several respondents spoke to the difficulty of securing the engagement and non-biased participation of the sales, marketing and finance functions within the entities. These actors would often not attend meetings, not provide valuable information and otherwise not put forward the necessary involvement that any multi-actor process needs for success (Mello 2010).

There are several implications to this insight. The first is that the demand planners, as orchestrators of the demand planning process, must be in close proximity to the other actors:

sales, marketing, finance and general management (Mello 2013). Having the demand planners perform their function remotely may create barriers to the free flow of market intelligence essential to the generation of demand plans. Market intelligence here refers to the strategic events that can significantly shape demand, such as promotions, business expansion, new channel penetration, launch timing or media campaigns, to name a few. Should the demand planner be far removed from the sales and marketing teams that possess the market intelligence, the mediating effect of having them under the umbrella of the general manager is removed and the transparency needed for successful S&OP alignment is undermined. If the planners are in close proximity to the other actors, it makes it more difficult for these other actors to disengage from the S&OP process. One respondent put it concisely *'If you do a lot of activities in marketing it's very important to have an intimate knowledge. Having demand planning close to the marketing and the sales organization is rather important.'* Referring to the same dynamic, another said *'Everything is done at the local level because that's where the action is'*.

This is also true for the return flow of information from production which communicates upstream constraints. Should bottlenecks or issues be identified upstream and there is no planner strongly embedded in the downstream team of the general manager to clearly and credibly explain the issue and work to propose alternatives, the general manager would have a higher temptation to return to gaming demand plans to try to garner a higher share of insufficient capacity and resources.

Another implication is that even if the demand planner is in close physical proximity to the other multi-functional actors, the mediation force works would ideally call for a reporting line to the general manager, either dotted line or solid line. The general manager would understandably wish to have a certain authority over the demand planning process if it is to be the driver of the financial plans over his P&L territory, as described above, but it is also desirable from the perspective of information sharing and transparency. Having the demand planner in the same building will not drive others to mediate within the S&OP process as much as having an understanding of a link to a common narrative and objective, generated by the sharing of the same financial consequences of a poor S&OP process. Placing the demand planner within the team of the general manager is akin to placing the demand planner with the same territory and encourages mediation. Said one company: *'Yes. I would say there is a dotted line and I do encourage that they are physically with the people of the BU to capture the business intelligence and other non-structured information.'*

This proposition is borne out through the results of the research. Strong and Weak Bidirectional Owner S&OP types have almost *four times* as much success at obtaining demand alignment as Partial S&OP Owners: 40-42% vs 11%. This is a compelling testimony to the power of having a shared authority structure.

Some respondents have attempted to defy this mediating force and have centralized at least the baseline part of the demand planning process. The expressed reasoning is that the baseline forecast is best derived through statistical means. This requires sophisticated

planning tools and highly qualified and trained demand planners. This advanced personnel profile may be difficult to find, attract and retain in subsidiaries, particularly in small ones. So a trade-off has been made to centralize the baseline demand planning at the risk of working against the mediating force of the accounting objects. The results have often been a lack of transparency to the critical market intelligence needed to properly prepare the baseline forecasts.

Another consequence is that the accounting force of P&L territoriality is too strong and the general manager simply disregards the baseline forecasts provided by the central demand planning team and overrides them. Said one company *'How are we going to have a demand planner at the European level who will say I put a baseline in the system and afterwards you do your thing. I just don't see it.'* The trade-off is then a losing bet, as the added value of the highly trained planners using expensive tools to generate statistically advanced baseline forecasts is lost in an S&OP multi-functional process that is inconsistent with the financial territories.

The notion of proximity to the business functions and intimacy with the team as defined by the P&L territory is beginning to be identified as a key success factor for multi-functional S&OP, at least by practitioners (Singh 2010, Lee 2013). Practitioner literature has begun promoting a process called Integrated Business Planning (IBP). IBP first began appearing in the literature in 2011 (Bower 2012). The emphasis is focused uniquely on the multi-functional dimension of S&OP and the criticality of having 'one set of numbers'. IBP is, in fact,

essentially a rebranded form of the S&OP multi-functional alignment process, positioned and marketed more clearly and strongly and a business practice rather than a supply chain management practice (Grillo 2014). The rebranding was done in the hopes that it would encourage the alignment of the demand plans and financial plans (Shanahan 2012). This is very coherent with anecdotal feedback observed operationally where supply chain managers have started calling the S&OP multi-functional alignment process 'business planning' in the hopes of gaining deeper adherence and engagement from the various functional actors (McGuffog 2011). The language of the IBP literature is tilted heavily towards collaboration and transparency, fully consistent with the mediation notion discussed here (Muzumdar and Viswanathan 2009).

Taken together, these arguments support of the relevance of conceptualizing the mediating practice of the S&OP process by drawing on the Miller/Power framework. The objective of the multi-functional S&OP process is an alignment between demand plans and financial/sales plans. That alignment is the narrative that drives the mediation inherent to the S&OP process and the lack of success of that process would be felt on accounting objects. In this way, the S&OP process can be seen by all of the actors as a mediation process to obtain the best possible demand and financial/sales plan.

Implicit in this last statement is that company executives are capable of discerning to what extent the demand and financial/sales plans are indeed the best, that they – and the performance of the actors that build them in the S&OP process – can be properly adjudicated.

4.5 *Adjudication*

Miller/Power explains that the idea of constituting managerial territories is indissociable from the allocation of responsibility. That is to say that if accounting bodies largely influence the definition of the territory over which they exert their authority, it follows that they may be evaluated or judged over these territories. The adjudication could be benchmarks against other territories, audit activities or performance measures that determine the extent of success of the manager and the actors in the territory. The adjudicating influence of accounting is not limited to contributing to the managerial territories, however. Miller/Power posits that the accounting techniques of counting, enumerating and summarizing are often deployed to carry out the adjudication within the firm. So accounting not only contributes to defining the territories, it contributes to the methods by which their competing performances are judged.

The key objective of S&OP is alignment, and one of the alignments is multi-functional and includes alignment with the financial plan. The current emphasis observed with practitioners today is to seek out the gap between the demand plan and the financial plan in each entity.

In fact, as discussed in the section on mediation, S&OP leverages a desire for financial plan accuracy into demand planning accuracy through the objective of multi-functional alignment. In this sense S&OP is using the financial plan accounting object as an instrument to a successful S&OP. If the firm has a desire for an accurate financial plan coupled with a policy

of aligning the financial plan and the demand plan then indirectly the demand planning accuracy is a proxy measure for the accuracy of the financial plan. It is a tangible example of a successful application of financial normative results into operational performance.

This opens the door to allowing the auditable credibility of accounting to be associated with the S&OP process. Our observation is that FMCG firms that are more experienced in S&OP implementation have extended the reach of internal audit activities to include the S&OP process. This lends powerful credibility to the S&OP process through the normative influence of accounting rules. It also provides a light tap on the shoulder to general managers who may not fully appreciate the link between the S&OP alignment process and the financial plan.

While many general managers find supply chain planning a nebulous exercise, most appreciate the importance of the impact of successful internal audits on the judgment of their performance. Firms are beginning to judge the separate entities by their ability to leverage the S&OP process into the 'one set of numbers'. The trend is revealed in the research conducted. In addition to the 5 companies reporting that they have a firm policy of closing the gaps between the demand plan and the financial plan with a set acceptable gap, another 11 companies are planning to implement a similar policy. That would bring the total to 16 companies, or nearly half of those surveyed.

Turning to the literature, literature reviews show a wide disparity in measures of S&OP performance (Thome, Scarvarda, Fernandez and Scarvarda 2011). There is currently no consensus that has emerged on what the most complete and representative measure is to

capture the effectiveness of the S&OP process. This is not surprising. For example, it would be a reasonable position to take that the demand planning performance measure is a fair representation of the performance of the multi-functional S&OP alignment. Yet anecdotal observations among dozens of firms tell a story of almost one definition of demand planning accuracy per company. Each one has their own measure – if it is normalized across the company at all - making benchmarking a difficult, time-consuming and laborious effort. There are disagreements about fundamental issues such as whether the denominator of the ratio should be the demand or the actual sales or whether the measure should be an accuracy (based on 100%) or a deviation (based on 0%). It's no surprise when looking at the fractured landscape of demand planning accuracy measures that there is no broader agreement on what constitutes successful S&OP performance.

One company in particular has struggled so deeply with how to measure and encourage demand planning accuracy that it has fully blurred demand planning with financial incentives. The company reported anecdotally that their policy was to issue fines to entities with poor demand planning performances. The logic being that the general manager, looking to have a healthy P&L, would prefer to invest and implement a robust multi-functional S&OP process rather than pay the fine. The company reluctantly admitted that this approach was not yielding success at all. It was much less effort and cost to simply accept the fine rather than going through the change management and education required to adopt a proper S&OP. This is just one example of the risks of going too far with the notion of accounting as a proxy for S&OP, a notion that will be explored further in this thesis.

Notably, Grimson and Pyke argue forcefully that the ultimate measure of S&OP performance is profit optimization (Grimson and Pyke 2007) as do others (Hahn and Kuhn 2011). On one level their argument has appeal. The horizontal alignment of S&OP implies that when there are resource constraints upstream then the downstream planning takes these constraints into consideration when determining the forward sales plan. After all, it only makes sense to plan to sell what the company knows it can supply. The horizontal alignment goes in two directions, however. If the multi-functional S&OP mediation leads to the discussion of extraordinary events, such as a new client or a major unforeseen business opportunity, a logical application of the S&OP process would be to examine the different scenarios associated with the situation. Different options for successfully supplying the goods needed for the opportunity come with different costs (overtime, expedited freight, inventory depreciation risk, etc.). These costs can be weighed against the potential gains of the opportunity and informed decisions can be made in the S&OP process. This path leads to S&OP alignment of demand plans being not just for top line P&L financial planning, but for bottom line planning as well. The S&OP process can become a lever to plan the operating margin of the company. This means that a more mature S&OP process that engages in scenario planning and financial trade-offs should see an improvement in profit optimization, as argued by Grimson & Pyke, and is fully consistent with the proposed positioning of Miller/Power's framework as a way to understand the success of contributions of S&OP (Warren 2012, Singh and Lee 2013).

4.6 *Subjectivization*

The final way in which accounting objects exert their influence in the shaping of organizational life in firms in the Miller/Power framework is subjectivization. The use of subjectivization here is that actors in a firm are agents who make decisions that have impacts not just for them but for others in the firm. The consequences of these decisions are calculable using commonly accepted accounting techniques. This confers visibility onto the actors on the true outcomes that can be connected with their decisions in a structured, normalized fashion. In the siloes commonly found in multi-nodal supply chains, actors often do not see the impacts of the decisions that they make. The S&OP process sheds light on the roles of each actor, highlighting for them and others the costs or savings of their decisions.

This notion of accounting as a way to make a subject aware of their role and responsibilities, assess individual performances and drive intelligent choices is at the heart of S&OP. The active development of awareness amongst economic actors previously not involved in or cognizant of their impact on the supply chain management is a fundamental part of S&OP's collaborative nature. Supply chain management is comprised of inherent trade-offs that must be arbitrated and integrated into the S&OP decisions. These trade-offs manifest themselves in different ways. Inventory versus service, reactivity versus production efficiency, client satisfaction versus execution costs (Vykhodets and Chumachenko 2012). Underlying these trade-offs is often not dispassionate weighing of costs and benefits but

rather each actor looking for optimization within the boundaries of their understanding of the costs to the firm, boundaries that are invariably limited.

Common illustrations observed in firms include: Supply chain management emphasizing optimization of inventory levels above the stated service level objectives of the company; marketing imposing an accelerated product renovation schedule with highly adverse effects on product returns and material obsolescence; or sales pushing for unjustified increases in customer inventory levels in order to reach time-based commercial targets.

As mentioned previously, scenario planning in S&OP is ultimately a structured process through which to establish and understand these trade-offs. Business opportunities maybe weighed against the costs to take advantage of them and the operating margin becomes a target to plan to rather than just top line monetized volumes. By creating these tangible links between planning and financial results, S&OP promotes understanding of trade-offs that are examined through calculative accounting process. Higher inventory for higher sales, risk of inventory write-offs compared to complex catalogues are examples of S&OP bringing accounting practices to bear to understand the total impact of decisions.

Here the pertinence of the Miller/Power hypotheses becomes clear. Financial methods do indeed provide a way to understand the impacts of one's decisions and performance, yet it is through S&OP that those impacts have a forum in which for them to be sought out, exposed

and acted upon. The S&OP process removes the barriers to the visibility of one's actions and enables the Mediating effect to discover intelligent, mutual trade-offs.

The linking of performance bonuses of sales or marketing personnel, or even general management, to forecast accuracy is part of making the connection between S&OP and firm performance brighter and more visible. S&OP has not created this agency on the part of these disciplines on financial performance or forecast accuracy, but it has brought it into clear prominence. The difficulty of each actor abandoning their biases is a key reason why many firms are observed to look to the general managers of the entity to arbitrate in the event of a lack of consensus between the different actors, as discussed previously under mediation.

However, though these suboptimal behaviours can be exposed, understood, quantified through comparative techniques during the S&OP process, the very notion of territorialization through accounting objects as expressed by Miller/Power can serve as an obstacle to subjectivization. The horizontal alignment of S&OP serves as a guide to see how this is possible and is in fact a challenge to S&OP success.

As shown, the four Miller/Power forces help explain and drive understanding of the misalignment observed in the S&OP process. It's useful to return to examples of misalignment cited earlier when detailing the constructs used in the research. As a reminder, these constructs were employed to demonstrate the relative effectiveness of the different

S&OP governance types in obtaining alignment. The examples cited can now be seen in the light of the four Miller/Power forces.

To this end, Table 8 resumes the examples detailed in Table 3, now with complementary information. The four Miller/Power forces are alongside the examples, helping to shed light on why these behaviours occur. To take one example from the table to illustrate, we can look at the example of inflating demand to increase buffer stocks. This behaviour occurs when a general manager does not feel concerned by the costs of excessive inventory but of course feels very much concerned by his inability to reach his revenue targets due to poor service. His reflexes are to consider only the impacts over his financial territory as defined by his P&L, exhibiting territorialization. The cost of inventory or the expenses leading to expedite that inventory are not within his territory. The S&OP process would help to highlight and understand these trade-offs of cost versus the added security of surplus inventory. This enlightened understanding of the impacts of one's actions is consistent with subjectivization. A cost comparison of the 2 options of being more transparent with demand or keeping surplus inventory would be to use an accounting process to judge the best option and evaluate the performance of the S&OP process in maximizing overall profit through scenario analysis.

Examples of Misalignment		Miller/Power Forces			
		Territorialization	Mediation	Adjudication	Subjectivization
Upstream - Willful Supply/Demand Imbalance	overly large production batches to reduce production fixed costs at the risk of reactivity and inventory	✓			✓
	producing to occupy assets and improve capital amortization	✓			✓
	producing to absorb plant fixed costs independent of demand	✓			✓
	refusing to use overtime or more expensive secondary or outsourced assets to alleviate capacity concerns	✓			✓
	refusing buffer stocks of material to improve reactivity	✓			✓
	improving cost of goods through high material purchases in disregard for obsolescence costs	✓			✓
	Understating capacity to avoid risk of unfulfilled supply plans		✓	✓	
	Understating reactivity to avoid risk of unfulfilled supply plans		✓	✓	
Downstream - Demand Plan Manipulation	Inflating demand to increase buffer stocks	✓		✓	✓
	Deflating demand to decrease overall inventory	✓		✓	✓
	Inflating demand to claim greater share of constrained resources	✓		✓	✓
	Lack of effort to anticipate promotional programs		✓		✓
	Withholding market intelligence information		✓		
	Lack of participation in demand planning process		✓		

Table 8 – Examples of Misalignment Linked to Miller/Power Forces

4.7 Finance Influence: Too Much of A Good Thing

With the influence of accounting objects now described, this influence has to be confronted with the testimony, as well as the author's experience and discussions with practitioners.

Supply chain managers active in their roles have often relayed anecdotes of the S&OP process losing sight of its core mission of alignment because of short term financial pressures. A close reading of the testimony from the respondents in this research echoes these concerns in different contexts. In presenting this research in its earliest forms at a Gartner conference, the audience questions often returned to the theme of distortion in the S&OP process by an overriding preoccupation with the concerns of the financial managers.

This combination of experience, feedback and field research leads to an important insight that must be highlighted. For as much the Miller/Power framework provides a powerful lens through which to understand the keys to successful S&OP alignment lies in the influence of accounting objects, this logic cannot be taken too far. Aligning the S&OP process and the demand plan with the finance plan is of high importance, as we've seen, but you can have too much of a good thing. As we will see here, we received valuable testimony in our interviews of the pitfalls of having too much financial control over the S&OP process.

Risks of Excessive Financial Involvement in S&OP

1. Misaligned Objectives

The first point to be clear about is that the managerial objectives are not always the same. Financial plans sometimes represent aspirations, even unreasonable aspirations that serve as 'north stars' for the company, used to express orientations and priorities, but not really founded in concrete reality. Forcing an alignment between the demand plan and the financial plan for a company that does not see the financial plan as a true presentation of forward performance will inevitably cause high friction. Either the demand plan will be willfully distorted to match the unrealistic financial plan or the financial plan will no longer serve the same historical purpose and will be transformed into a more grounded financial forecast. This is not necessarily undesirable, but if senior management and the financial community are not in agreement, then they will invariably put pressure on the demand plan to conform to the financial plan and undermine the S&OP alignment.

2. Insufficient Appreciation of Supply Chain Trade-offs

Another risk is that finance may not fully appreciate the many trade-offs occurring in the S&OP process and may sometimes see the S&OP process as a way to reach an inventory target, making the working capital the immovable goal of S&OP, not the alignment of supply and demand. This can lead to having too little inventory at the end of a financial period or not anticipating capacity crunches down the line.

3. Monetization of the Demand Plan

Respondents frequently mentioned the challenges of translating a unit volume demand plan into a monetized financial plan. The S&OP process is vulnerable to getting bogged down in discussions about using average costs or per product costs to transform the units into value.

This highlights the difficulty of keeping master data clean and actionable. Even a figure as fundamentally important as price may change rapidly, particularly in a developing market, making the task of monetization challenging. Per one respondent, *'We are in markets where there is a strong degradation of prices. The problem is when we monetize forecasts with unit prices of today I don't get the right result.'*

4. Gross vs. Net Financial Plans

Another challenge may be temporary price reductions, or volumes of products given away for promotional purposes. These must be accounted for in the S&OP demand planning process, but not in quite the same way for financial plan. In many companies the top line financial plan is the gross revenue less expenses such as returns and volume rebates. Since these variables are both unknown and have no impact on the S&OP process, it is difficult for demand planners to integrate them. These problems can be significant. Said one respondent: *'Some of that might be – and I'm being very critical here – because the general managers aren't quite as connected with it as they should be ... we look at the volumes and try to turn that volume into value and connect it into what's in the financial plan we see a misalignment and so there is debate around volume.'* Another company describing this issue: *'We are taking the overall forecast, demand plan, lumping in 2 groups, best and others and then the average selling price*

is linked to that level. There is a comparison but it is very, very high level, an aggregate, not enough granularity for the supply chain [management].'

5. Discredited Financial Planning Process

Perhaps most importantly, several companies testified that the financial process simply wasn't credible. The budgets and trends reported back to corporate entities for consolidation were unrealistic, general managers know this is the case and this is how the financial game is played in their company. This seemed to be more common for emerging markets. Here the financial plan is not acting as a managerial aspiration, but rather as a 'wink and a nod' to corporate headquarters towards the goal that has been set, with the mutual understanding that these volumes will not be met and the financial plan will slowly drift downwards as the year progresses. In other words, the financial planning process may not be a credible corporate actor and it would be counterproductive to use it as a source of input and alignment for the S&OP process.

This denies the S&OP process the most powerful lever for successful multi-functional alignment, as we've seen. This was well explained by one respondent: *'We drive the budgeting process more directly from the demand forecasting process and relate it to that transparency and openness. In the systems your demand forecasts are visible right up to the CFO from the moment you press send and they are in the system. So culturally this is actually quite a big change and it demands some behavioral changes at all levels. Because if you expect people to turn their pockets out and put in what is a realistic demand forecast you have*

to then treat the numbers you get in the right way. Because in the past I think there was this unspoken poker game going on which was well I'm not going to turn my pockets out completely to you my boss. Your boss is sitting there knowing that you're not turning your pockets out completely. So what happens is that a certain uplift gets applied to the numbers you put in and that's the way whole world has been turning for the last however many years.'

6. Horizon and Granularity

Turning to more concrete – even technical – considerations, there are sometimes real differences in the plans themselves. Finance may not be as concerned with the forward months if they fall into the next year, or may only want quarterly buckets where the supply chain management needs weeks or months.

In the same way, the S&OP may need planning discrete to each product at the SKU level, while finance may only need the product family. If finance begins running the S&OP process, these supply chain management considerations may not be taken into account and the demand plan will not be fully exploitable for the rest of the end-to-end S&OP process.

7. Local vs. Global Optimization

Lastly, some actors in Finance bring a strong logic of local P&L and balance sheet ownership to the table, and push for solutions where each inventory actor should be optimizing their link in the chain. This goes against the idea of an end-to-end, integrated supply chain

management where the inventory is placed at the best spot to service the whole chain, and decisions about supply or demand constraints are taken with the whole chain in mind.

These risks associated with excessive financial involvement in the S&OP process are summarized in Table 9.

<i>Risks of Excessive Financial Involvement in S&OP</i>		
1	Misaligned Objectives	Financial Plans may represent aspirations, not attainable goals
2	Insufficient Appreciation of Supply Chain Trade-offs	Over-focus on working capital at the expense of service
3	Monetization of the Demand Plan	Complicating the process of transforming volume in cash
4	Gross vs. Net Financial Plans	Inclusion of free goods, rebates and other deductions to gross sales
5	Discredited Financial Planning Process	Through unwritten rules of comportment, Financial Plan not seen as a credible projection
6	Horizon and Granularity	Differences in length, frequency and level of detail of planning
7	Local vs. Global Optimization	Overly concerned with local P&L or balance sheet optimization at the expense of others

Table 9 – Risks of Excessive Financial Involvement in S&OP

4.8 The Challenges of Horizontal Alignment: Transfer Pricing and Total Cost of Ownership

Up to now, we have looked at Miller/Power as a way to help understand the contribution of governance and authority to the objective of S&OP alignment. The insights have been to frame S&OP as an enabler of mediation, adjudication and subjectivization over territories defined largely by accounting. However, we have looked almost exclusively at the multi-functional alignment of S&OP. The description of S&OP here is that there are two dimensions of alignment: horizontal and multi-functional. For the S&OP process to succeed at multi-functional alignment, we have seen that having all actors sharing the same territory and mediating as posited by Miller/Power is fundamental. However, this territory – defined by the accounting objects like the P&L and balance sheet, is distant from the upstream actors in horizontal integration: factories and vendors. The factories are rarely included in the same territory where the multi-functional alignment and collaboration occurs.

It's worth reiterating that the separation of accounting territories is contextual. It is the product of the multi-nodal nature of today's supply chains, as explained in the introduction. When the supply chain is linear, the barriers of territories do not exist, as said by one senior supply chain management executive in describing the earlier, non-multi-nodal configuration in his company: *'The factory was in the country, the plant manager was on the country management committee and he lived the business.'*

The Miller/Power framework provides a different insight when used to understand the horizontal alignment of S&OP, from customers through to vendors. In this dimension, Miller/Power helps us to understand the challenges facing S&OP alignment of supply and demand along the horizontal axis, as will be discussed in this section.

The reasons that multi-functional alignment of S&OP can be successful within a defined territory show how it can be challenging with horizontal alignment with factories. The factories are often acting within a separate accounting territory. This problem is a modern one. In previous incarnations, supply chains were more 'linear' in nature. Factories serviced one market, and were more directly connected through the shared P&L and balance sheet.

As supply chains have become more complex and multi-nodal, the factories service multiple markets and markets are serviced by multiple factories. This encourages separation of accounting objects between upstream and downstream. Firms have set up different observed governance structures to enable financial flows between factories and the markets they service. In all of these structures, there are difficult financial questions that become very impactful on the effectiveness of the horizontal S&OP alignment process. These questions arise because of isolated decisions, and the isolation occurs because of separate accounting territories between the factories and the markets.

Some examples illustrate the cloistered decisions that can be made when managers are acting upon different accounting territories: Sourcing focusing uniquely on the cost of upstream

materials, leading to suboptimal sourcing decisions concerning agility, supplier run sizes and reliability. S&OP encourages the linkage of these sourcing considerations to customer service and inventory levels and depreciation.

Factory managers are strongly incentivized on the economic performance of their facility. This leads to resistance to working overtime, running suboptimal lines, increasing staff and other actions that may be needed to satisfy customer service expectations; or production batch sizes dimensioned more for manufacturing efficiency than for agility and quick changeovers to respond to customer demand or minimizing inventory depreciation exposure.

One anecdotal example represents the almost absurd finality of the logic of accounting territories applied to horizontal integration. One pharmaceutical company described their internal policy for resourcing production if the habitual factory normally responsible for production is short of capacity. The responsible factory must put out for bid the production in excess of capacity to both contract manufacturers and other internal factories capable of supporting the production. The responsible factory is strongly incentivized to find the cheapest possible price, be it with an internal or external partner. For their part, the other internal factories - usually in other regions and certainly with their own accounting territory – are encouraged to maximize potential profit *even though their commercial counterparty is an internal partner.*

The result is often that the responsible factory selects a contract manufacturer for a price that, seen from the responsible factory's perspective, is the least expensive option. However, the internal factories that did not assume the production have lost an opportunity to defray fixed costs that would have been spent regardless.

This effort to treat the internal factory network as analogous to an external network is reminiscent of work comparing supply chain management to a competitive network (Ellram 1991). The approach is that the same competitive theory dynamics that drive industrial organization decisions such as verticalization or external contracts are an appropriate model to drive supply chain network management in multi-nodal configurations.

The result is an overall loss for the company, as locally optimal decisions do not lead to an overall positive result. This example was repeated by several respondents and was far from an outlier. This dynamic recalls a famous, non-supply chain management case where a major retailer attempted to run each product group in competition to each other, with disastrous results (Kimes 2013). The risks of the P&L as definer of controllable territories comes with real consequences.

The result of this separation can be explained and understood by relying on the Miller/Power framework. Should S&OP be fully implemented in multi-functional integration, the territories defined by accounting objects cleave the supply chain management in two, separating the upstream and downstream portions and blocking horizontal alignment. Mediation across

territories is difficult at best, and adjudication pits parts of the supply chain management against each other.

A common refrain among downstream actors is that the upstream manufacturing is not sensitive to the concerns of the business and the customers. They feel that manufacturing actors are too focused on their performance measures and costs and insufficiently focused on service and reactivity. This conforms perfectly with the idea of adjudicating using accounting objects over a defined territory. Said one pharmaceutical company: *'One of the very strong drivers of accountability of a site director of manufacturing site is to recover the costs for their site. That then drives some suboptimal behaviour because for example it would lead them to create more inventory and put more volume through the factory. But if it doesn't match up to a demand forecast then you've got a problem with both inventory and potentially with write-offs'*.

This company is describing a willful supply imbalance driven by adjudication through accounting objects. The factory is acting rationally to the accounting performance measures they have been given, concretely manifested through cost of goods and the view of the factory as its own accounting territory.

This translates to a barrier to horizontal S&OP alignment as the factory begins to position itself as an isolated actor servicing many internal clients. This is described by an industrial company: *'... that creates a problem in supply chain planning because there is very little*

vertical planning. Essentially I am my plant, I have my schedule, my customer, I run MRP and I send it out to my vendor. There's no planning other than pure MRP with some basic safety stocks.'

It's not a surprise, then, that some of the more experienced interviewed companies in S&OP spoke about looking beyond classical cost of goods and logistics cost models into a more complete vision of the cost of a product from material procurement to customer delivery. They are recognizing this issue. *'We have siloes in operations. Huge siloes with the business. No shared KPI. Stand-alone methodologies developed by operations. And the rules were not even understood by the business. We were not speaking the same language'*, explained one supply chain management executive.

Transfer Pricing

This thesis is not the first place to describe behaviours to drive optimal results in discrete internal profit centers that are suboptimal for the firm as a whole. This is covered under the subject of transfer pricing, the question of how to establish the price of goods and services exchanged between business units of a firm, usually when one unit is a manufacturing unit and the other is a commercial unit (Hirshleifer 1956).

Transfer pricing has long been recognized as being not purely a matter of accounting, but of also of shaping behavior. Ronen and McKinney identify three qualities of proper transfer

prices: (1) enable the corporate group to evaluate the separate internal P&L contributions to profits, (2) motivate P&L managers to behave in a way that is optimal for company profit as a whole and (3) stimulate efficiency without losing business unit autonomy (Ronen and McKinney 1970). In these three attributes we can see the shadows of Miller/Power. Transfer pricing - an accounting object – as a means to establish territory within which managers are adjudicated on their performance.

One recognized issue for transfer pricing theory is that business units do not really have complete autonomy over the variables that impact their performance. In fact, one of the most notable examples is the variability and predictability of the demand curve when looking at a dyad of a manufacturing business unit and a commercial one (Ronen and McKinney 1970). This is precisely the objective of S&OP: to align the demand and supply across this dyadic link. Only in multi-nodal configurations, the links are multiplied.

Indeed, it can be argued that transfer pricing is only necessary when there is a multiplicity of links between manufacturing and commercial business units, in other words the multi-nodal supply chain. Transfer pricing can then be seen, like matrix organizations and planning, as a means for obtaining integration where the company has organized itself to be in divisions differentiated to better respond to localized business environments (Watson and Baumler 1975).

There is abundant literature on the optimal mathematical models to deploy to determine the transfer price, using different approaches that must assume either a fluid external market for the intermediate product leaving the factory or not (Ronen and McKinney 1970). The focus here, for the interests of S&OP, is how the transfer price may impact managerial behavior in such a way as to distort the demand/supply balance objective of the horizontal S&OP process.

Some accounting literature has broached this subject, by recognizing that transfer pricing never occurs in a free market environment, and marginal cost is rarely known or understood by all of the internal actors (Holmstrom and Tirole 1991). This leads to a recognition that transfer pricing may generate incentives that shape unobservable management behaviours (Holmstrom and Tirole 1991), an observation that is certainly shared here and revealed in the research.

Total Cost of Ownership

A handful of these companies have begun to speak in terms of 'total cost' and not in terms of the cost of goods versus the transportation cost versus the customs cost versus the distribution cost. This is reminiscent of the concept of 'Total Cost of Ownership (TCO)', a concept that appeared in the literature about twenty years ago, and referred specifically to looking at all aspects of the cost of purchasing goods or services. The concept encourages going beyond the stated cost of the product and including other aspects of cost and performance such as quality, reactivity, service, innovation, sustainability and social

responsibility (Ellram 1993). Some efforts have been made to gauge the applicability of TCO to supply chain networks but continue to apply them to external partners (LaLonde and Pohlen 1996).

Miller/Power sheds light on a significant and immediate barrier to this TCO approach as applied to internal supply chain management, that of accounting territories that inhibit incentives. The accounting structures of multi-nodal companies are constructed in such a way as to deter collaboration on TCO rather than encourage it, and horizontal S&OP alignment is but one manifestation of this (in questions of inventory, service and flexibility). Other areas impact include logistics costs (in customs, transportation and storage/picking), design costs (in adapted packaging or product harmonization), production costs (in terms of line efficiency and added value).

What sets the S&OP horizontal alignment process apart from the others in the company is that it is the only governance structure that spans from end-to-end. S&OP is the only process that, at an operational level, struggles with the barriers of accounting territories to accomplish its core mission. It's not surprising that it is a process that manifests the difficulties in effective subjectivization across accounting territories.

4.9 Context Matters

This is a good moment to take a step back to fully appreciate the implications of the Miller/Power framework as presented. If the firm's supply chain is linear, the contribution of framework to the S&OP is limited. In this context, the production is local and in all likelihood in close proximity to the market. Said differently, from an S&OP perspective, the local market is effectively the entire company. If there are other markets with their own factories, they each have their own S&OP process and each market acts independently. The reflections here about the accounting influences manifested through territorialization, mediation, adjudication and subjectivization have less importance since there is only one territory that binds the horizontal S&OP to the multi-functional one.

It is only when the supply chain is multi-nodal do these questions come into play, where a series of markets or business units are being serviced by a series of factories. In this configuration, the accounting territories cannot encompass the whole network. The natural territories form, comprised of each market or business unit, and one or many factories. It is in each of these territories that mediation and adjudication occur. And the boundaries of these territories between the factories and markets create a real, tangible obstacle towards effective subjectivization. These boundaries hinder horizontal S&OP alignment of supply and demand just as they promote demand and financial alignment.

For multi-nodal supply chains, the contribution of Miller/Power's framework towards the conceptualization of S&OP is more nuanced in this light. For multi-functional alignment of S&OP it shows the path to success, while for horizontal alignment it shows the pitfalls and challenges.

It is in this context that Miller/Power's insights offer true value towards furthering the conceptualization of S&OP and even creating the beginning of some contours of a normalizing contribution that should be considered as fundamental to the S&OP concept.

Summary

This section has presented a deep exploration of the links between management control and S&OP and potential for this avenue to further the conceptualization of S&OP. To briefly summarize:

An overview of management control concepts that link to S&OP was discussed, with a focus on the notions of responsibility centers, the controllability principle and budget planning.

This led into a deep discussion of the Miller/Power proposition that accounting objects influence organizations in four distinct ways and how that helps better understand the S&OP concept: territorialization, mediation, adjudication and subjectivization. Each of these forces was argued as contributing to a deeper conceptualization of S&OP in the multi-functional dimension

From there, the respondent testimony was used to demonstrate that this approach of linking S&OP to finance comes with risks and challenges that must be considered by practitioners, with seven distinct variables that may undermine S&OP if not attended to.

The Miller/Power framework also helps to understand the challenges to S&OP in the horizontal dimension, as explored through a look at the TCO concept.

5. CONCLUSIONS

This section will discuss the conclusions drawn from this research.

First and foremost, the research question is revisited to demonstrate how it has been successfully addressed through this research.

Next, four normative rules for practitioners looking to improve the ability of their S&OP to achieve alignment are presented and explained. A focus on the role of maturity in S&OP is presented through the testimony of the respondents.

This is followed by a discussion of the contributions this research may offer in the larger sphere of supply chain management, including an alternative perspective on supply chain management KPIs.

Lastly, the limitations of this research are confronted through a discussion of the research validity.

5.1 Addressing the Research Question

This research has explored S&OP in a unique, innovative way. Rather than looking to describe S&OP in the form of meetings, planning techniques, service targets, performance calculations and inventory optimization tools, it treats S&OP as a management process.

The management process of S&OP stands alone in that the expectations are to achieve alignment amongst diverse actors in both business units in the form of multi-functional alignment and end-to-end in the form of horizontal alignment. S&OP is the only process that carries expectations of orchestrating so many different actors and agendas. The success or failure of the alignment process is deeply connected to the scope and authority that S&OP is given, the configuration of the supply chain and the accounting structure of the firm.

At this stage, the research points to some normative elements that emerge and should be articulated and kept in mind by managers looking to understand the level of success and suitability of their S&OP process.

We can return to the research questions detailed at the start of the thesis to help structure the conclusions as well as present recommendations for practitioners:

How do firms with multi-nodal supply chains establish supply chain governance to achieve S&OP alignment in the multi-nodal context? Do these firms recognize difficulties in

establishing both alignments in parallel? In particular, do multi-nodal firms observe behaviours that illustrate non-alignment between the supply and the demand, or demand that is not an attempt to reflect the forward expected financial performance of the firm?

The research has clearly demonstrated that companies have recognized the issues presented by the multi-nodal context, and have responded in different ways. We have identified 4 different types: Strong Bidirectional S&OP Owners, Weak Bidirectional S&OP owners, Partial S&OP owners and Connectors. The typology proposed in this research addresses the first part of the research question: *How do firms with multi-nodal supply chains establish supply chain governance to achieve S&OP alignment in the multi-nodal context?*

That we see four different types illustrates that companies are taking different approaches to supply chain governance in the multi-nodal world. A striking number of respondents began their testimonies with the proviso that their governance model had just been restructured and we still solidifying. Others made clear that the governance model was about to change, with modifications that were significant but at different stages of clarity.

This evolving state of supply question governance points us towards evidence that addresses the second part of the research question: *Do these firms recognize difficulties in establishing both alignments in parallel?* That companies are seeking new angles to establish supply governance is interesting but insufficient in establishing that they are encountering difficulties. The approach used in this research of using willful supply and demand distortions

and imbalances as an instrument through which to objective of S&OP alignment yields a clearer reply to this part of the research question. The stated inability of companies to inhibit an aware, conscious gaming of S&OP process is an unambiguous result that also provides insight into the final part of the research question: *In particular, do multi-nodal firms observe behaviours that illustrate non-alignment between the supply and the demand, or demand that is not an attempt to reflect the forward expected financial performance of the firm?*

The testimony of the respondent companies regarding their inability to achieve alignment goes further than a lack of control over non-alignment behaviours. Only a handful of the companies interviewed have established a successful policy of alignment between the demand plan and financial plan. In fact more companies expressed a desire to have demand/financial plan alignment capability than those that stated that they currently possess it. This is revelatory not only in that it addresses the research question, but that the research question reveals a growing trend and practitioner realization of the importance of the underlying issues that generated the research.

The proposed typology shows its pertinence as a construct in that the data indicates the existence of a link between the governance types and S&OP alignment, but that governance type is not in and of itself sufficient. The ability of the company to align demand and financial plans plays a strong role in achieve complete S&OP alignment, particularly in the multi-functional dimension.

Taken together, the different ways in which the research questions were addressed points us to four S&OP alignment rules that succeed in furthering S&OP conceptualization in the multi-nodal world.

5.2 *The Four Rules for Linking S&OP Governance to Alignment*

Rule 1

Build an S&OP structure that spans from end-to-end.

Multi-nodal companies having bidirectional S&OP ownership have demonstrated a better ability to achieve S&OP alignment in both supply and demand than companies with an S&OP governance that does not span both directions. In order to construct governance that fosters successful S&OP alignment, the company must recognize that S&OP activities are occurring from the many factories to the many markets. Broad bidirectional governance tampers down on willful manipulations and bias, yielding alignment. The bidirectional authority does not appear to have to be in the form of a solid line. Dotted line authority on the part of the supply chain management appears to bring as much alignment as solid line authority.

This structure then calls for having a centralized supply chain management organization that shares authority and accountability from demand planning to production planning. With this governance in place, the supply chain management can now be credibly held accountable for the service and working capital performance of the firm.

Rule 2

Implement a formal alignment with financial plans

Having a formal policy of aligning the demand plan and the financial plans has more impact than S&OP governance structure on promoting transparency, limiting bias and achieving the alignment between supply and demand. After putting in place a bidirectional S&OP governance structure, a financial plan that is in line with and reflective of the demand plan is the most powerful combination for successful S&OP. The importance of financial planning and intricate relationship to the authority and territory of the general manager can be conferred onto the S&OP process, bringing credibility and collaboration in the form of mediation.

Rule 3

Be mindful of the maturity of the financial planning process

Although the importance of linking the demand plan and the financial is to achieving a successful S&OP has been established, it is critical to not go faster than the music of the financial planning. The foundation of the S&OP process will be built on sand if the financial planning process is *immature* or in other words *not credible* and these risks go beyond the potential incompatibilities of granularity or horizons mentioned earlier.

The notion of financial maturity is the underlying implication of the fifth risk of excessive financial control over the S&OP process mentioned in the previous section. As reminder this risk is called is *Discredited Financial Planning Process - Through unwritten rules of comportment the financial plan not seen as a credible projection*. The key point here is that

the financial planning process is not seen as sincere, transparent effort to arrive at the best forward projection of the firm's financial performance. Examples of an immature financial planning process were described in chapter 4.7.

It was shown that only a handful of companies have a firm, stated policy of aligning the demand and financial plans. This is critical, but not sufficient. There is still the possibility that the demand plan is *forced to match* the financial plan rather than the financial plan being *derived from* the demand plan.

The goal of the mediation influence is that all actors are on board with the idea that the financial planning process is one of the deliverables of the S&OP process. Between the low-maturity state of simply identifying the gaps between the demand plan and the financial plan and the high-maturity state where the financial plan is derived from the demand plan, there is an intermediary state. This state is where the demand plan is *forced to match* the financial plan. When this state is paired with a credible financial planning process that strives to reflect the best information of the forward financial performance of the business entity and is done over the same territory, this intermediate state is adequate if not fully optimal. It is adequate because the financial impacts of insufficient inventory or overly ambitious promises to centralized authorities will drive local general management to have the demand plan be unbiased and transparent.

Even the financial maturity is high and the financial plan is derived through the S&OP process that does not mean the two plans should be completely identical. One can imagine situations where a company does not feel that a potential development warrants inclusion in financial plans, but would like the supply chain management fully prepared for the eventuality.

An example from personal experience can illustrate this. A few years ago, after much commercial effort, we were optimistic that one of our young product lines would be placed in a major American retailer, but the deal was far from certain. This would represent a significant breakthrough for the brand and an opportunity not to be missed or put at risk. Yet the prospect of this occurring was not high enough that it should be included in the company's financial projections. This was the decision of the general manager and as a team we were fully aligned with his direction. In order to take the right decision, in the S&OP process all functions agreed and aligned on the potential volumes, and the supply chain management performed a scenario analysis on the risks to working capital should the opportunity not pan out. Armed with this information, we all agreed that the working capital risk was small compare to the risk of being unable to react if the new client retailer placed an order in a short time frame. This is an example of a high financial maturity environment wherein the S&OP process drives the financial planning through scenario analysis.

In order to measure and close the gaps between the demand and financial plans, the S&OP process requires some data sophistication. Monetization of demand plans may seem anodyne, but there are plenty of pitfalls to getting it right. Starting with averages is fine, but

move to real cost ideally integrated in the demand planning tools to allow for real time demand shaping decisions.

The final objective will be to have the capability to predict not just top line but bottom line impacts for a true cost to serve vision. At this point, the goal of the alignment is not just to have one set of numbers, but the ability to evaluate different scenarios on working capital and company profitability. This is coherent with the next ambition of the S&OP process as expressed by the more mature companies, a process often referred to as Total Cost of Ownership.

The impacts of financial planning maturity on S&OP can be seen on Table 10.

<i>Financial Maturity vs S&OP Alignment</i>			
	<i>Financial Plan Maturity</i>		
	Low	Intermediate	High
Financial Plan Objective	Non credible infrequent exercise in ambition setting	Infrequent effort at top line projections	Best projection of future performance in top and bottom line
Alignment	Demand Plan Compared to Financial Plan	Demand Plan Forced to Financial Plan	Financial Plan Derived Through Demand Plan
Monetization	Using Averages	Using Real Costs	Using Real Costs and Gross Margins
S&OP Objective	Understand Gaps	One Set Of Numbers	Scenario Planning and Total Cost of Ownership

Table 10 - Financial Maturity vs S&OP Alignment

Rule 4

Do demand planning where the business decisions are made

The value of aligning the S&OP with the financial plan is having the mediating effect of all actors working on the process in a transparent, collaborative way. The understanding is that all are bound by the authority and territory of the general manager who will arbitrate and drive towards the best solution as it binds him to a credible financial plan. The implication is the actors involved in the mediation have the necessary information required to build a complete demand plan and have the decision making authority to shape the demand as a result of constraints and opportunities. If marketing plans and sales plans are built locally and general management accountabilities are at a local market level, then that is 'where the action is' and where the demand planning should be conducted.

This insight argues against demand planning conducted in part or in whole at a centralized level unless tactical or short range strategic decisions are done centrally as well. Many companies we spoke to see the appeal of centralizing demand planning. Centralization allows companies to implement better, more sophisticated statistical analysis tools (Boyer 2012). They can recruit more talented people to get the most out of these tools. Also, the center of excellence can more easily implement and control the respect of demand planning procedures. But these understandable, rational benefits are overshadowed by the importance of proximity and shared authority to the business owner of the decision making P&L and his functional team.

There are more tactical, tangible reasons as well. Many companies are looking to develop shared demand plans with key accounts, through a process called Collaborative Planning, Forecasting and Replenishment (CPFR). The value of CPFR is not limited to having improved demand plans. It also contributes to a stronger, more collaborative commercial relationship with the account (Baumann 2010-2011) (Sagar 2010, Smith, Andraski and Fawcett 2010). This strong relationship can then be leveraged by the supply chain management to implement initiatives like Vendor Managed Inventory (VMI), which on its own can smooth out flows, limit downstream inventory builds and so inherently improve demand planning (Free 2007, Nakano 2009).

Lastly, companies are looking to leverage the potential of demand shaping, the practice of using supply information on opportunities and constraints to help shape demand. One example of demand shaping may be to propose or modify a promotional program based on product availability or excess inventory positions. With the ongoing prominence of e-commerce permitting a more direct link between manufacturer and consumer, the potential of demand shaping is growing. In order to fully exploit demand shaping, supply chain management teams must be in close proximity to sales and e-commerce management teams. This would permit the fluid exchanges of information needed to take advantage of opportunities for demand shaping, which often are on very short notice with small windows.

It is for each company to examine the structural authority constructed by the business and implement an S&OP governance accordingly. The two must be compatible for the S&OP

process to succeed in its alignment objectives. This last rule is critical to leveraging a credible, mature financial planning process into a credible, mature S&OP process.

The four rules are summarized in Table 11.

<i>S&OP Alignment Rules</i>		
1	Build an S&OP Structure That Is End-to-End	Use strong or weak directional ownership types
2	Implement a Formal Alignment With Financial Plans	A written, mutual agreed policy between Supply Chain and Finance
3	Be Mindful of Financial Maturity	Policy should match state of financial planning
4	Do Demand Planning Where Decisions Are Made	Line up demand planning execution with decision making P&L

Table 11 – S&OP Alignment Rules

The four rules can be linked to the typology that derived from the research as described in Chapter 3 as well as the four Miller/Power forces and is illustrated in Figure 16.

Rule 1 states that the S&OP governance should be end-to-end, be it as Strong or Weak Bi-Directional Owners. With this structure in place, the decision of where the demand plan is performed is dictated by Rule 4. The location should be governed by proximity to where the market intelligence is generated and the business decisions are made that. This is the source of market intelligence. This could be at the center (regionally or globally) or in each market.

Rule 2 states that, regardless of where the demand plan is generated, there should be a formal alignment between the demand plan and the financial plans. If Rule 4 is respected, then the result should be the general manager making the business decisions, and so accountable for the financial plans, is also accountable for the demand plan through the alignment between the two plans.

And finally Rule 3 is a caveat that this alignment must be mindful of the financial maturity of the firm. This is to avoid aligning the demand plan with a financial plan resulting from a managerial process that is not yet mature enough to seek the best, most accurate projection of future financial performance.

The four rules exist and make sense within the context and the help of the Miller/Power forces of territorialization, mediation, adjudication and subjectivization. The accounting territories define where the mediation will occur, the sphere of adjudication and the barriers that subjectivization must cross.

The four rules recognize and respect this framework by looking to match the location of the demand planning to the business decision making responsibility (rule 4). The S&OP governance end-to-end type (rule 1) looks to bridge the divide of the different accounting territories to make broader planning decisions in the company's interests. The link of the demand plan to the financial plan (rule 2) recognizes and leverages the power of accounting

within the firm to the benefit of S&OP while respecting the limitation that this cannot exceed the existing financial maturity (rule 3).

5.3 Furthering S&OP Conceptualization: S&OP Maturity

The four rules detailed above were not derived uniquely from analysis of the field research. They were developed through an examination of the research through the prism of the work in Management Control of Miller/Power. It is their insight into the forces through which accounting objects exert strong influence over organizations that helps to provide the advancement in S&OP conceptualization offered here.

The influences of P&Ls, Balance Sheets, financial budgets and plans, cost of goods and other accounting objects are a powerful framework for understanding the four rules and why they provide a positive contribution to S&OP conceptualization. We can begin to see S&OP as not just a list of meetings with attendees, or techniques in planning, batch sizes, safety stock sizing, statistical demand planning methods or other important but subsequent elements. First and foremost, S&OP is a management process that must understand, address and respect the challenges of a multi-nodal supply chain and how it drives governance choices.

Maturity and the Management Process

The underlying thread of this thesis is that this management process can be undermined by behaviour that leads to S&OP misalignment. These behaviours can be mitigated through S&OP governance and a policy of alignment of demand and financial plans, as we have seen. But as we are speaking about behaviours here, there is a common theme that many of the

companies expressed that warrants attention and discussion, particularly when speaking of behaviours. It is the notion of *maturity*.

The idea that maturity is critical for S&OP has been broached only rarely in the literature. Lapide equated maturity with a robust S&OP process, where meetings are scheduled and agendas prepared (Lapide 2005). While important, this does not seem to be in the same vein as the testimony.

Looking to supply chain management literature more broadly, there is some interesting related research. One paper links supply chain management business process maturity to the degree with which to processes lead actors in different functions to turn away from their traditional roles in order to integrate with others (Lockamy and McCormack 2004). The research in this thesis seems to support this view, with the additional element of experience being a driving factor towards the higher maturity.

Other efforts seem to take a different view of the idea of maturity in supply chain management. There is an equivalence drawn between maturity and best practice implementation (Netland, Alfnes and Fauske 2007). The arrow of causality is different here. It is not the same thing to say that organizations that are mature are those that have successfully implemented the SCOR model, for example, then to say that maturity is a necessary condition for all actors to comport themselves in a responsible, transparent manner without biases and manipulations.

Of the 27 companies retained for the data analysis, 11 companies – more than one third of them – cited the role and importance of *maturity* in the success of S&OP.

Some examples to illustrate the perception of the role of maturity in the context within which the respondents used it:

1. One company stressed that the success of S&OP only comes after the process and tools have had time to flourish. The longer the processes have been in place, the more successful they were even with the same governance structure. *'We saw this during our maturity assessments of the different markets that one general trait is that the longer you have had APO in place and the processes along with that then the more mature you are as well.'* This was expressed by another company that stressed the comportment of the actors beyond the process and governance: *'Just from an execution you need to have also the maturity of people there in the different positions.'*
2. Another stressed that the maturity of the general manager was more critical than the actual processes and governance. *'There are processes and that's where the maturity of markets comes into play. You have a market with a low level of maturity for the GM. Other markets where they understand well the S&OP process and there is one number alignment and the S&OP is not a supply chain [management] process it is a business process and the GM signs off and it's one number and it's the same number that supply chain [management] communicates up the chain.'*

3. Echoing this and relating to financial maturity, another company said, *'We're trying to drive maturity in our volume-to-value and the connect to the finance process and we're quite immature in that aspect of the S&OP process. I think as we drive maturity there then actually we might get more response from the GM saying well actually I don't agree to these numbers.'*

The broad, consistent theme is that the companies equated 'supply chain management maturity' with both experience and transparency, a willingness to 'play the game' and be honest actors.

As expressed by the testimony here, supply chain management maturity is a behavioural approach that is required for the S&OP process and governance to be successful in obtaining alignment, not that alignment is – in and of itself – a sign of maturity. In other words, S&OP maturity is seen as the necessary condition to leverage the proper governance and processes into alignment.

5.4 Another Way To Look at S&OP KPI

The research done thus far on S&OP Key Performance Indicators (KPI) helps to demonstrate two aspects of the literature that are consistent with the findings of this research.

The first is the inherently financial nature of many of the measures. As mentioned earlier, Grimson & Pyke felt that maximizing profitability was the only true measure of S&OP performance (Grimson and Pyke 2007). One could understand if a practitioner took this to be a bit reductionist. The second aspect is that the S&OP KPI identified do not lend themselves well to multi-nodal configurations. They are influenced by too many variables that cross too many accounting territories (Gunasekaran, Patel and McGaughey 2004). The result is a blend of KPI that have too many driving factors that span both dimensions of S&OP (Aviv 2001, Gunasekaran and Kobu 2007, Estampe, Lamouri, Paris and Brahim-Djelloul 2013). Since S&OP is seen as the domain of supply chain management, and we have seen here through the typology that supply chain management structures often do not have a full span of control over the two dimensions of S&OP, then that forcibly places the KPI as inadequate measures when the S&OP governance types are Partial S&OP owners or Connectors.

This is well illustrated in the recent article by Hulthen, Naslund and Normann (Hulthén, Näslund and Norrman 2016). They propose a framework for measuring the performance of the sales and operations planning process through 12 company interviews. Their approach is to distinguish KPIs of efficiency and those of effectiveness. They call upon measures proposed

by Thome (Thome, Scarvarda, Fernandez and Scarvarda 2011) and others in order to classify the various KPI. Even in a work like this, with a rigorous cataloguing of S&OP KPI, the difficulty of KPI to match with the span of control emerge. Among the KPI cited as measures of S&OP efficiency is inventory adherence. Yet to whom would this KPI be assigned? Without authority over factories that generate inventory through willful supply imbalance, the supply chain management is without levers to act upon this KPI. A similar issue is seen with demand forecast accuracy. Without authority over the process that generates the demand forecast, the supply chain management may feel victimization at being held accountable for this KPI. The intersection of stock and demand planning is service level, measured in various ways such as On Time In Full (OTIF) or Perfect Order. Without accountability on inventory or demand planning, the service KPI is flawed measure of the effectiveness of S&OP performance.

However, in their effort to measure S&OP process effectiveness, Hulthen, Naslund and Normann support the findings described here. They propose using KPI such as degree of cross-functional engagement and participation in the S&OP process. This signals coherence with the idea of mediation as a force that drives cross-functional participation. Their findings match those here that obtaining engagement of non-supply chain management actors is a challenge to S&OP, one further understood by the fact that many of the impacts, as measured by the proposed KPI, are not felt on their financial territory. In a multi-nodal configuration this problem is only magnified by the multiplicity of contact points. The implications of this are reflected in the results found in this thesis.

Hulthen, Naslund and Normann stress the current lack of frameworks for assessing the performance of the S&OP process, and rightly so. Using the notions of willful supply/demand imbalance and demand manipulation as constructs to measure the effectiveness of the process may be one of the more indirect contributions of this research if developed further.

5.5 Contributions Beyond S&OP

This insight of looking at S&OP through the forces of accounting objects has potential value for supply chain management in more than simply S&OP and may be seen as contributing to the most under-researched themes of supply chain management.

Returning to the positioning of S&OP as a subset of SCI, the contributions here offer some avenues for the broader issue of integration, efficiency and flows.

One element that can illustrate this is supply chain efficiency. Supply chain efficiency has been used here as an example of one of the drivers of willful supply/demand imbalance. The efficiency in question here may be operational equipment efficiency (OEE), but it may also be logistics efficiency in the form of transportation cost affected by rushed transport modes, sub-optimally filled containers or elevated storage costs driven by excessive inventory. This example, when seen in the light of the discussion here, is clearly linked to both the S&OP process and the four forces of the accounting bodies. The intended forum for discussing and deciding upon trade-offs in supply chain efficiency is the S&OP process (Hahn and Kuhn 2012, Hahn and Kuhn 2012). The mediation aspect is what drives actors to come together to consider the cost scenarios, the territorialization gap between the factories and the markets is what creates obstacles to doing so, the adjudication provides the costing techniques that permit a quantified debate and subjectivization is how the different actors understand their impacts in supply chain efficiency.

In this light, what may seem to be purely quantitative, calculated supply chain engineering problems like transport cost or production yields are in fact the ways in which the broader supply chain integration brings elements into the S&OP process and subjects them to the governance forces of S&OP. This is a key insight: the challenges of broader supply chain integration in terms of efficiency and flow are in fact linked to the S&OP subset, and so just as vulnerable to the forces described by Miller/Power.

A recent work by Weiland, Handfield and Durach looks at what a broad community of supply chain management (SCM) researches believe *will* and *should* be the future themes of SCM research (Weiland, Handfield and Durach 2016). Their objective was to identify the themes in SCM research that have the largest gap between what scholars believe should be a focus of attention and what likely will be the actual focus. The result identifies the most fertile high potential ground for future supply chain management research. First on their list of most under-researched areas of SCM was the *'people dimension'*. *By this they mean 'roles of individual actors and groups in decision making models ... that includes behavioral biases'* and includes the impacts of *'governance-influencing properties of supply chain systems.'* Third on their list is *'integration internally between departments'*. Weiland, Handfield and Durach report that the SCM scholars in their survey indicate that *'integration between different departments in an organization turns out to be a neglected theme.'*

The contributions of this research fall squarely within this fertile ground that Weiland, Handfield and Durach identify. The conclusion of the impacts of S&OP governance on the performance of S&OP is directly in line with the SCM scholar identified research opportunities in both of these areas. It touches on the governance model, of course, and as S&OP is a process inherently built on internal integration within an organization, this research contributes in that theme as well.

5.6 Limitations of the Research

It must be said that all conclusions in a research project must recognize their limitations.

There are legitimate points to be discussed about validity and reliability that must be addressed.

Research Validity

The first validity to explore is the *construct validity* (McCutcheon and Meredith 1993, Meredith 1998). The key construct decision in the research is to apply the constructs of willful supply and demand distortions as representations of an absence of alignment. Since S&OP is a process involving many actors, the underlying assumption is that these actors are honest brokers providing the best, latest information they have and acting in good faith. Parties simply cannot be aligned in the absence of full knowledge and understanding on what it is they are aligning to. Willful manipulations and distortions run completely counter to this reasonable definition of alignment and serve as a fair proxy for alignment.

Selecting and defining the construct is necessary but not sufficient. The method used to collect and measure the construct must be appropriate as well. Face/content validity is an important component of construct validity (Mentzer and Flint 1997), and must of course be coherent with the research design. Using two interviewers with strong and credible experience in supply chain management was critical to the choice of the constructs for S&OP

alignment. Live discussion and exchange with knowledgeable interviewers created an environment sufficiently comfortable and conducive to honest, open dialogue. In this environment, the respondent is more likely to express aspects of the internal S&OP behaviour in their company that may shed them or the firm in a negative light.

There is a practical element that must be recognized as well. It would not be unreasonable for a fellow supply chain practitioner to reply that for them the true indicators of alignment are the absence of superfluous inventory, acceptable levels of demand planning accuracy and service disruptions that were limited strictly to extraordinary events like quality issues or significant unexpected client behaviours. They would have a fair point, but only to the extent that it applies to their context. Implicit conditions to this 'quantifiable-measures-as-construct' approach is that the measures are available and comparable. Neither condition applies here. The identification of inventory as superfluous, root causes of service disruptions and what constitutes acceptable demand planning issues vary at least from company to company, and very likely have many iterations within each company. The identification of a reasonable proxy was critical to moving forward and the arguments support the choice that was made.

Next to consider is *internal validity*. Here internal validity refers to the extent to which we can be sure that the observed differences in success at obtaining S&OP alignment are linked to the governance structure in place. Given that this research is exploratory in nature, this is a legitimate concern that cannot be written away.

The data analysis method used is descriptive statistics. Data is used in this research in a descriptive fashion. Only the most basic applications of statistical treatment have been applied. As the research is primarily exploratory and descriptive, there is coherence between the research methodology and the data treatment. There have been questions raised in the past as to applicability of using data in supply chain management research, but very prominent researchers defend the use of empirical case study approaches using limited statistical analysis in qualitative logistics research (Ellram 1996). There was no presumption of having a suitable cohort to conduct thorough statistical analysis (Langley 1999). When coupled with the risks of structured interviews as described above, we cannot say with certainty that the rules spelled out in this conclusion are without a doubt built on an ironclad link between S&OP success and governance.

One remedy to consider is data triangulation. Given that over 30 companies were interviewed, it would not have been workable to examine hierarchy charts, demand plan vs financial plan reconciliation documents or written alignment policies. Even if as researchers we were prepared to execute such an undertaking, it's doubtful that any company would have shared this information with us.

To the extent that one accepts the construct and internal validity, the *external validity* of this research can be considered legitimate and persuasive (Siggelkow 2007). That is to say, the conclusions put forward in this thesis in the form of the four normative rules should have

merit and add value should they be applied by practitioners. This is true regardless of geography, global or regional multi-nodal configuration and even the nature of the business offer, be it product or service. Looking at the variety of companies that participated, the conclusions are valid even when considering major supply chain structural differences such as make-to-stock or make-to-order.

As a completely anecdotal confirmation of this belief in the external validity, the approach and conclusions of this research have now been shared both informally and formally with many supply chain management practitioners and in forum venues. The pertinence of the topic, the research methodology and the conclusions have all been embraced by these practitioners, with many of them asking for more detailed presentations and an opportunity to discuss in greater detail.

That said, it would be presumptuous to have the same confidence in the *reliability* of the research. When considering all of the arguments given previously regarding the potential impacts and risks of interview bias and preconceptions, it seems plausible to imagine that a different interviewer might have small variations in the results, even if the research were conducted with the same questionnaire and with the same respondents. As explained earlier, a key element of the research design was to choose constructs that require the respondent to feel that the interviewers will understand, appreciate and in a way merit a full disclosure of the internal company practices.

Another element to consider in reliability is the impact of time and its effect on respondents (Mentzer and Flint 1997). Many of the respondents told us that their organizations were planning significant changes to the governance of their S&OP. This has a dual impact on reliability. The first of course is that if one were to perform the same research after the structure has changed, the responses will certainly not be the same. The second is that the same respondent will have understood more about S&OP and about S&OP practices in their own company. The result is that even if the interviewer were the same, using the same questions, the responses may not be consistent with those obtained in the initial research effort.

Another limitation is linked to the depth of representation of each participating company. Interviews were conducted with 1-3 respondents at each company, and always in one joint interview session. This is a clear limitation given that the scope of the research concerns multiple actors in the company, multiple functions and multiple geographies.

This position with regards to reliability is consistent with a posture of post positivism as described earlier in the section concerning epistemology. It seems difficult - even incongruous - to say that there is an element of interpretation on the part of the researcher and then say that there is complete reliability and repeatability of the research.

5.7 *Practitioner Reception*

The conclusions of this research have been formally presented to senior managers at 4 companies (at current count), including some of the largest consumer goods companies in the world. The reception has been enthusiastic. There is strong endorsement of the constructs to measure S&OP success, as practitioners confirm the difficulty in suppressing manipulative, willful behaviors that distort the S&OP process.

This research is helping them address the challenges they face in trying to implement S&OP governance as they transition to a multi-nodal configuration. The connection to accounting objects is clear to practitioners, as the structure of the internal P&Ls is always cited as a strong influence in their preferences for S&OP governance.

Another element that has received strong endorsement is the rule of tying S&OP to financial maturity. Many companies I have briefed on this research immediately have their attention drawn to the idea that aligning demand and financial plans must be done as a function of the maturity of the company's financial planning process.

That this research has been embraced with practitioners should not be so surprising. A very recent survey done by IMD just a few months prior to this writing helps explain why there is such practitioner interest (Seifert 2017). Seifert highlights that over the course of the next

three to five years, the top two drivers of supply chain management are 'Supply Chain Strategy/Integration with Business' and 'Applying Sales and Operations Planning (S&OP).' Taken together, this helps demonstrate the immediate relevance of this research.

It not only provided critical guidance in the successful application of the four rules. The research also makes a clear link to the business structures through the influence of accounting objects and the importance of aligning demand and financial plans.

5.8 *In Summary: The Key Takeaways*

S&OP is about everyone in the firm transparently and collaboratively planning the near and medium activity. The process strives to match the supply from factories with the best projection of the forward demands. Getting it right means better service with less working capital, cost and waste. In multi-national companies, this means the S&OP process has to be in close proximity to sales and marketing in decentralized local markets, as well as specialized factories that service several of these markets at once. The demand and supply plans that the S&OP process delivers have direct impacts on the perceived performance of both the markets and the factories, leading each to seek to either directly manage or strongly influence the S&OP process, leading to the question of what governance model the company should have for S&OP, and where does the supply chain function fit?

Interviews with 27 multi-national companies have revealed that there are 4 different types of S&OP governance, with different levels of success in obtaining supply and demand alignment. This finding was then explored using a powerful framework from Management Control that helps understand the influence of accounting objects on S&OP. Taken together, this allows for the articulation of four normative rules for S&OP governance.

The first rule in securing the transparency of all of the actors towards horizontal alignment lies in having a central supply chain function with dotted or solid line authority to both supply planning and demand planning, leaving space for the local functions to share authority. The second rule is to have a clear policy of alignment between the demand plans and financial

plans, to ensure the engagement of local general management and commercial actors. But, as the third rule, caution is needed, as the financial plans must be sufficiently credible. Lastly, for the alignment of demand and financial plans to have an impact, the demand planning should be done where the business decisions are made, so that the alignment is done with the general management that most feels accountable and can take actions to impact the forward financial plan. Figure 16 summarizes the four alignment rules.

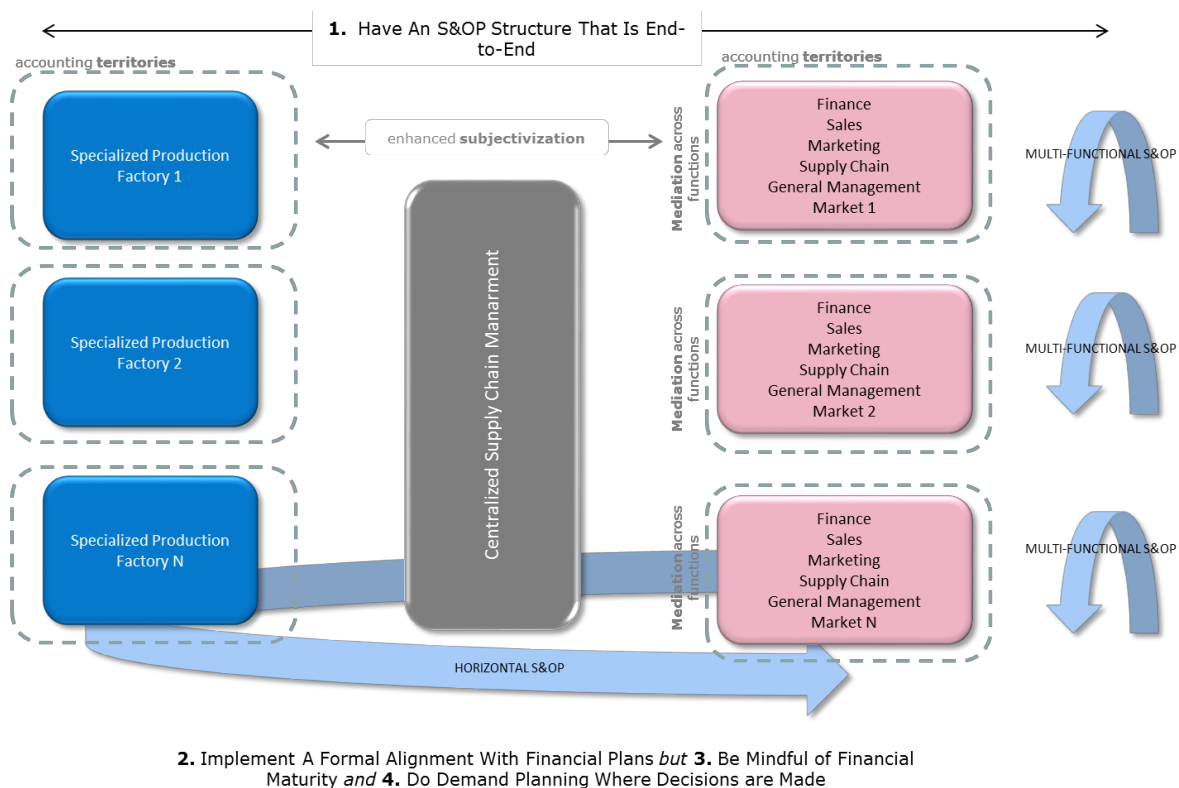


Figure 16 – S&OP Typology and the Four Alignment Rules

Summary

This section has presented the conclusions of this research. To briefly summarize:

As a capstone to the research presented and discussed here, four normative rules have been presented to help achieve S&OP alignment: build an &OP structure that is end-to-end, implement a formal alignment with financial plans, be mindful of financial maturity and do demand planning where the decisions are made. An exploration of the importance of maturity as expressed by the respondents is presented in the context of furthering S&OP conceptualization, as well as the potential for this research to contribute to the broader supply chain management sphere.

The final element of this section discussed the limitation of the research by examining the research validity. The construct validity, internal validity and external validity were all examined as well as the reliability of the research. The confidence of the research validity is high, but there are important caveats that were addressed and cannot be neglected, such as the complexity of large organizations and ever-changing structures. The credibility of the interviewers, so critical to the necessary transparency, has a downside in the risk of bias in interpreting testimony.

Lastly, the positive reception by practitioners is highlighted and discussed.

6. FURTHER RESEARCH

It's hoped that the contribution of this research is to see supply chain management less through a technical lens and more through a managerial one. The four conclusions shared here put forward the importance of understanding organizational obstacles to orchestration of the end-to-end operational resources and the ability of the supply chain management to be a strategic element in the marketing and commercial strategy. This understanding points to a few potential avenues for research moving forward.

The literature is scarce on the subject, but anecdotal feedback at practitioner conferences and forums is an interest in driving cost optimization that looks for the best compromises and trade-offs from cost of goods through to customer delivery. This is being referred to often as TCO, though in the literature the few explorations of TCO have been limited to a more holistic view of purchasing choices with vendors (Ellram 1991). Some practitioners have called it Cost to Serve, though others limit Cost to Serve to downstream activities of distribution, warehousing, transportation and customer care. In any event, the spirit of TCO is to link the downstream costs to the upstream costs to find the best, most optimal scenario.

This can even be seen as the pendulum swinging back from production specialization, a process that was solely focused on cost of goods. Many companies have provided feedback that they wish to better integrate the increased customs and transportation costs that been impacted by production specialization. Other important cost drivers like batch size, package size, product harmonization and catalogue size have impacts across the broader supply chain (Pagell 2004). If companies are to successfully implement analysis and action plans on TCO,

they will be obliged to confront and overcome the obstacles described by Miller/Power and demonstrated by S&OP. An exploratory research program on the state of TCO to define the state of interest, typology of cost domains and barriers would be a desirable extension of the research done here.

Along these lines, it might be interesting to examine the different approaches companies have put into place to capture extraordinary costs on transfer pricing between factories and markets. In the linear supply chain context, transfer pricing is not a contentious issue. Any extraordinary costs like overtime, expedited freight or small purchasing runs are shared on the same P&L as the market that is seen as the cause of the cost generation.

The impacts could be on the balance sheets as well, if the instability of the demand plans generate excessive inventory depreciation. But in the multi-nodal supply chain context, demand planning perturbations of one market may generate costs that would impact other markets. A reflex of 'justice' or 'fairness' can take hold, and many companies have reporting setting up elaborate mechanisms to identify and charge markets that they feel have generated unusual manufacturing costs that should not be borne by all markets, only the 'offending' market. This behavior is coherent with the territorialization described earlier. A descriptive case study to examine such a practice may reinforce the usefulness of Miller/Power to describe the challenges faced by multi-nodal supply chains in a tangible way that could be appreciated by practitioners.

Taking this line of thinking further, a similar survey could be conducted to examine the balance sheet policies that companies have put into place regarding inventory ownership. The focus in this thesis has been more on P&L accounting bodies, but the arguments posited to explain the observed behaviours should be illustrated by issues regarding inventory ownership as well.

One of the overarching themes that emerge here concerns the contribution management control has to make on the governance and management of the supply chain. The most important research avenue moving forward is, I believe, a deeper collaboration between the two disciplines of Supply Chain Management and Management Control to understand and identify what other connections can be made. The work here has been inspired by one approach, that of Miller/Power. With the door now ajar, there are unknown avenues in supply chain management behavior around key performance measures and incentives that are waiting to be uncovered.

A discussion of avenues for further research would not be complete without identifying the limits of the work done here and what may be done to overcome them.

The research methodology involved using a novel construct to measure S&OP alignment, the notion of behaviour that runs counter to the spirit and reality of a transparent, collaborative S&OP process that leads to alignment. This behaviour was captured through an interview process that established trust and credibility and relied on the connection established

between interviewer and respondent. For the purposes of an exploratory study this construct has been useful and revelatory. However it is not a fully rigorous construct. Further research could seek out methods to render this more positivist. Avenues may include triangulation of data or a tightly targeted questionnaire. Among the risks with the rigour of this construct is that practices may vary greatly within a company, either geographically or across business units. A more restrained scope along one or both of these dimensions might help limit nebulous responses. Another advantage of such an approach would be to expand the number of companies so as to enter into quantitative research posture.

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The last mention, of course, is for my parents, who instilled in me the value of education, and of life as a never-ending learning voyage, of which this PhD is a vital chapter.

8. APPENDIX A

Questions asked during structured interviews.

1. How are your supply chain and sales channels configured?
2. Is your planning Process organized in a consistent way with the P&L structures?
 - a) *Demand planning*
 - b) *Supply Planning*
3. Which of the following stages are included in your S&OP process? Are they aligned to the P&L?
 - a) *Country S&OP*
 - b) *Market S&OP*
 - c) *Business Unit S&OP*
 - d) *Global/Executive S&OP*
4. To what extent is finance included in the demand and supply planning stages of the S&OP?
5. Is the finance function responsible for presenting any information at the S&OP or Exec S&OP meetings, if so:
 - a) *What information is presented?*
 - b) *Who is responsible for presenting?*
6. Do you have a methodology to monetize the operational plan, if so:
 - a) *Is this compared with the financial forecast?*
 - b) *How far out are the forecasts compared?*
 - c) *Do you have any rules to align the financial and operational plans?*
7. To what extent is finance involved in the analysis of opportunities and risk, which are considered as part of the S&OP process?

8. To what extent is finance involved in the creation or evaluation of scenarios presented as part of the S&OP process?
9. When reviewing the plans at each stage of the S&OP is the expected level of profitability calculated, if so:
 - a) *How is this done?*
 - b) *Are profitable trade-offs presented as part of the S&OP process?*
10. Where gaps are identified between financial and operational plans:
 - a) *What degree of gap is acceptable*
 - b) *Who arbitrates?*
11. Who is accountable for the production plan? Do you see supply imbalances due to over emphasizing production efficiencies over supply chain considerations?
12. Do you see willful manipulation of demand plans by business actors to either over or underestimate demand?

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