



# Plan for supply chain agility at Nokia

## Lessons from the mobile infrastructure industry

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### Abstract

**Purpose** – The purpose of this paper is to describe how demand planning can increase agility in supply chains. The paper builds on a case study from mobile infrastructure industry with explicit focus on project business environment.

**Design/methodology/approach** – The paper contains a short theoretical review on supply chain agility, different planning and forecasting concepts and explores the linkages between them. Empiric evidence is collected from Nokia Networks as a case study. Main lessons are primarily taken from integrated project management program that is to implement a truly customer-focused delivery process in the case company.

**Findings** – Suppliers should pay more attention on effectively utilizing customer's project plans for aligning their supply chain. Supply chain agility does not just happen but requires continuous planning.

**Practical implications** – Common project planning is the most natural way for customers to share future demand information between the supply chain players. Instead separate and often laborious demand forecasting process, suppliers should utilize customer's project plans in building agility in their supply chains.

**Originality/value** – Focuses on the importance of the ability to adapt to rapid and unexpected changes and asserts that a continuous, customer driven planning process is a pre-requirement for being agile in supply chains.

**Keywords** Agile production, Supply chain management, Project management, Demand forecasting

**Paper type** Case study

### 1. Introduction

Global markets are becoming more turbulent and volatile in most industries. The importance of ability to adapt to rapid and unexpected changes is, therefore, growing extremely fast. It is no surprise to notice how many operations managers have included “agility” in their latest development road maps. Also Lee (2004) encourages companies to pay more attention on supply chain agility, as demand and supply tend to fluctuate more rapidly and widely today than they used to. Agile supply chain is not any novel concept as such, but has its origin back to flexible manufacturing systems in late 1960s. Christopher (2000) defines supply chain agility broadly as a business-wide capability that embraces organizational structures, information systems, logistics processes and, in particular, mindsets.



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In the mobile infrastructure industry supply chain agility is already considered a basic competitive requirement – not any sustainable differentiation opportunity. During the recent years the industry has been characterized by frequent market changes and varying, unique customer requirements of large operators. System vendors have to be able to quickly respond to short-term changes in demand. On one hand, they are forced to have an in-built ability to constantly adapt their supply chains to rapid and unexpected changes in the markets or technologies. On the other hand, the vendors are expected to be fast and flexible while delivering customized products and services with high-standard delivery accuracy. The way agility is implemented into vendors' operations implicitly defines the cost-effectiveness and competitiveness of their supply chain.

Building agility into operations is not a trivial trick for any vendor. At minimum, it requires an agile operations strategy and in-built process capabilities to respond short-term changes in demand or supply quickly. To be agile in the eyes of a customer, the vendor has to somehow be prepared for the demand. In other words, agility does not just happen, but operations need to be planned for it. If realized customer demand were a complete surprise to the vendor, it would be far too late to execute received orders with short lead-times and keep the customer satisfied. Based on our experiences in the industry, a continuous, customer driven planning process is actually a pre-requirement for being agile in supply chains.

Planning is anticipatory decision making before real action is required. More sophisticated and accurate is the planning better possibility the vendor has in creating process agility in a cost-effective way. In our industry both manufacturing and service operations should be included in the vendor's planning process. It is highly important to ensure that material and resource plans are always aligned. A recent AMR study shows the great importance of demand forecasting and planning; demand forecast accuracy creates high responsiveness and cut costs right through the supply chain (Frischia *et al.*, 2004). According to the study, companies that are best at demand forecasting, maintain on average 15 percent less inventory, 17 percent stronger perfect-order fulfillment and 35 percent shorter cash-to-cash life cycles.

This paper describes how demand planning can increase agility in supply chains. The key theme "plan for agility" highlights the fact that supply chain agility does not just happen but requires continuous planning. The paper contains a short theoretical review on supply chain agility, different planning and forecasting concepts and explores the linkages between them. Our focus is merely on project business environment. The special interest is on effectively utilizing project plans for aligning the supply chain. Empiric evidence is collected from mobile infrastructure industry in Nokia Networks. Main lessons are primarily taken from integrated project management (IPM) program that is to implement a truly customer-focused delivery process in Nokia Networks.

## 2. Supply chain agility and demand planning

### 2.1 Agile supply chain strategy

In general, an agile supply chain is all about being fast and flexible. Lee (2004) specifies that the main objectives of supply chain agility are to respond to short-term changes in demand or supply quickly and to handle external disruptions smoothly. Intuitively, agile supply chain is also highly market responsive, because it is able to fast react on

sudden demand peaks. Fisher (1997) states that innovative products should always require responsive supply chain that responds quickly to unpredictable demand in order to minimize stock-outs, forced markdowns and obsolete inventory. Mobile communications systems, clearly, are all innovative products. It is probably, therefore, why supply chain agility and responsiveness have already become more or less standards in the industry. Agility alone does not anymore provide a competitive advantage in supply chains, but it is rather a prerequisite for the competition.

Christopher (2000) defines four key characteristics for agile supply chain. First, an agile supply chain is always market sensitive with capability of reading and responding to real demand. Focus is on capturing actual customer requirements with direct feed-forward methods and not to rely much on market forecast information. In agile supply chains actual execution process is always more demand-driven rather than forecast-driven. Second, extensive demand and supply information sharing between buyers and suppliers creates a virtual supply chain where physical inventories are maximally replaced with information. The effective use of automated transaction systems, e.g. collaborative e-business solutions, between supply chain partners is often required for creating agility into operations. The third key characteristic for agility is deep process integration between the partners. The extensive demand information sharing also enables truly collaborative working methods, joint product development and common systems between buyers and suppliers. Fourth, agile supply chain typically is network based with shared targets. The supply chain partners create competing networks with committed and close relationships with their final customers.

Agility and lean (i.e. doing more with less) are easily considered as two completely opposite supply chain strategies. However, this contradiction is not always necessarily so, but these two strategies can coexist at the same time in a company. Also Towill and Christopher (2002) stress that agility is not the same as “leanness.” In today’s volatile markets no single paradigm can provide a universal answer meeting all possible market demands. One size does not fit all products and customer segments, but rather a company should conjoin the usage of these concepts according to market needs. Meeting customers’ needs requires that all of these selected strategies are integrated so that the total business may operate successfully (Aitken *et al.*, 2002). One could say that in the mobile infrastructure industry supply chain can become a real competitive advantage only if complimentary partnerships of relevant lean and agility practices are applied.

Methods how companies can implement agility into operations are various. There are several models to define steps for successful “agility”-implementation in the literature. Most recently, Lee (2004) suggests that focus should be on:

- promoting flow of information with suppliers and customers;
- developing collaborative relationships with suppliers;
- designing for postponement;
- building inventory buffers by maintaining a stockpile of inexpensive but key components;
- having a dependable logistics system or partner; and
- drawing up contingency plans and develop crisis management teams.

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This prescription is also very much in line with the definition of responsive supply chains for innovative products (Fisher, 1997). Fisher (1997) advises that market responsive processes can be built by decisively deploying excess manufacturing capacity and significant buffer stocks of goods, by investing aggressively in ways to reduce lead time, by selecting key suppliers primarily for speed, flexibility and quality, and by utilizing modular product design in order to postpone product differentiation for as long as possible. There are also other good rules of thumbs for implementation available in the literature (Christopher, 2000; Ross, 2004). Our conclusion is that on general level successful implementation of supply chain agility always requires demand driven approach, good end-to-end visibility, and deep process collaboration between all supply chain partners.

### *2.2 Right supply chain design*

Agility also requires the use of the right supply chain design to be effective. The structure of agile supply chain is greatly linked to manufacturing and logistics postponement strategies. Postponement deals with delaying the start of activities until time there is a real demand, i.e. specific customer order, for it. The main logic behind postponement is that risk and uncertainty costs are tied to the differentiation (form, place, and time) of goods that occurs during manufacturing and logistics operations. To the extent that parts of the manufacturing and logistics operations can be postponed until final customer commitments have been obtained, the risk and uncertainty of those operations can be reduced or fully eliminated (Pagh and Cooper, 1998). The postponement is a useful approach, especially, in the mobile infrastructure markets which is characterized by turbulent demand fluctuation, short product life-cycles, large amount of product varieties, and need for customized solutions.

The postponement concept was first time introduced in the literature in 1950s and later further developed by Bucklin (1965). Initially, postponement was only applied in the logistics and distribution environment (logistics postponement), and then later it was also utilized in manufacturing (manufacturing postponement). Apart from the postponed forward shipment of goods (time postponement) and maintaining goods at a central location in the channel (place postponement) certain manufacturing activities could also be postponed (Van Hoek, 2001). Van Hoek (2001) defines postponement as an organizational concept whereby some of the activities in the supply chain are not performed until customer orders are received.

In practice, the selected postponement strategy also determines the position of order penetration point (OPP) or decoupling point in the supply chain. The further upstream the location of the OPP in the supply chain, the more the manufacturing and logistics activities are postponed. The aim, naturally, should be to strive for an OPP as far upstream as possible. In other words, the aim is to postpone manufacturing and logistics as much as possible with maintaining high customer service standards. According to Towill and Christopher (2002), one particular way of exploiting both lean and agile paradigms is the right selection and setting up of a material flow decoupling point. Upstream of this decoupling point, the processes are designed to be lean. Downstream the processes are designed to be agile. Towill and Mason-Jones (1999) have demonstrated that there are actually two decoupling points in supply chains. The first is the one already referred to, i.e. the “material” decoupling point, or OPP, where strategic inventory is held in as generic a form as possible. The second

decoupling point is the “information” decoupling point. It is in effect the furthest point upstream to which information on real final demand penetrates. This information feedback loop with customers and suppliers essentially reduces upstream amplification and distortion of demand. By managing these two decoupling points a powerful opportunity for agile response can be created (Christopher and Towill, 2000).

### *2.3 Demand forecasting vs planning*

It is basically a prerequisite for telecom system vendors to have a customer driven planning process in place in order to be agile in the eyes of the customers. Agility does not just happen, but operations need to be planned for it based on market forecast information. Moon *et al.* (2000) describe that at Lucent Technologies, one of the vendors in the mobile infrastructure industry, customer demand planning is a core business planning process enabling its sales teams to develop demand forecasts as input to inventory and production planning, revenue planning, and service planning processes. At Lucent demand forecasting is the process of developing the most probable view of what future demand will be, given a set of assumptions about technology, competitors, pricing, marketing expenditures, and sales efforts. Planning, on the other hand, is the process of making management decision on how to deploy resources to best respond to the demand forecasts.

An important observation in Lucent’s processes is that there is a clear distinction between demand forecasting and planning in practice. Demand forecast is a prediction of future events used for planning purposes and planning is anticipatory decision making before real action is required (Krajewski and Ritzman, 2001). Also Vollmann *et al.* (2005) consider forecasting and planning as separate concepts. The difference between the pattern of demand and the response by the company points out the important distinction between forecasts and plans. Forecasts of the quantities and timing of customer demand are always estimates, which might or might not occur. Based on those estimates sales and operations plans are derived. The plans specify how the company will respond to the estimates.

The role of sales and operations planning is to maintain a proper balance between demand and supply, and to provide early warning signals when they are becoming unbalanced (Vollmann *et al.*, 2005). In agile supply chains, where postponement strategies are effectively used, the need for sales and operations planning information is vital especially for upstream of the decoupling point. Suppliers should always be shared with the latest demand information on product quantities and timing. Both manufacturing and service operations of the vendor should be included in the planning, as it is essential to ensure that material and resource plans are always aligned.

According to Menzer and Moon (2004), there are three types of demand within sales and operations planning process; independent, derived and dependent demand. For supply it is essential to understand distinguishes between these demand types. The amount of product demanded (by time and location) by the end-use customer of the supply chain is called independent demand. Suppliers of the next level see only derived demand that results from what they need to do to meet demand from their immediate customer. The third type of demand is called dependent demand representing components that go into a product. These different demand types are vital to understanding when deriving plans from demand forecasts.

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#### 2.4 Understanding demand and selecting appropriate planning methods

There are four fundamentals in sales and operations planning: demand, supply, volume and mix (Vollmann *et al.*, 2005). All these four elements should be extensively considered when designing a planning system. For supply chain agility our main emphasis, however, is on the element of customer and market demand, which probably is always the most challenging part to fix in sales and operations planning.

Characteristics of customer demand can vary market by market. To understand the behavior of market demand it often is useful to analyze its history data. Time series analysis can easily be created when making repeated observations of history demand for a product or service. There are five basic patterns of time series that are commonly known (Krajewski and Ritzman, 2001). In horizontal pattern market demand fluctuates around a constant mean. Here, the level of demand does not heavily increase or decrease over a long time-period but keeps continuously changing in shorter time horizon. Systematic increase or decrease in demand creates a trend. This happens if market demand is steadily moving to a certain direction during a long time-period. In seasonal pattern demand consistently show peaks and valleys over a fixed time period, like in a year. For instance, it is very typical to see annual demand peaks for certain products when Christmas is getting closer or summer vacation period starts. Cyclical demand pattern reveals gradual increases and decreases over extended periods of time (years or decades). This demand pattern often follows certain business or technology life cycles. Finally, there is also a random demand pattern in certain markets where variations in demand are basically not possible to forecast. There is no real shape in the demand pattern.

Several factors may affect on demand patterns, both external and company internal factors. When designing a planning system it is important to agree certain key principles in the very beginning. Based on our experiences these principles should provide answers to key questions, like what to plan and when, which items to use, what type of forecasting or planning technique to use, how process is designed and what kind of tools to use. The level of planning aggregation is also crucial, as it defines how similar products are clustered in planning. The level of aggregation has a direct impact to overall planning accuracy, the key measurement that needs to be carefully designed to support the need. Normally, different time horizons for planning are simultaneously utilized with a slightly different level of details, for example, in short-, medium- and long-term plans.

In general, demand forecasting and planning techniques can categorically be divided into two main areas: qualitative and quantitative forecasts. Also a combination of these two methods is possible and commonly used. Qualitative forecast are also called as judgment methods. They are often used when no adequate historical data is available or when demand pattern is highly random. There are several types of judgment methods. The most known ones are sales force estimates, executive opinion, market research, and Delphi method. Sales-force estimates are forecasts that are compiled from estimates of future demand made periodically by members of a company's sales force. Executive opinion represents a forecasting method in which opinions, experience, and technical knowledge of one or more managers are summarized to arrive at a single forecast. Market research is systematic approach to determine consumer interest in a product or service by creating and testing hypotheses through data-gathering surveys. Delphi method is a process of gaining consensus from a group of experts while maintaining their anonymity.

The quantitative methods are numerous. One way to categorize is to break them down into causal and time series methods. Very shortly, linear regression, the most commonly used causal method, builds on assumption that one (dependent) variable is related to one or more independent variables by a linear equation. Knowing the demand for these independent variables gives good basis for accurate planning. Rather than using independent variables in forecasting demand, time series methods use historical data regarding only the dependent variable. Time series analysis identifies the underlying pattern of demand that combine to produce an observed historical pattern of the dependent variable and then develops a model to replicate it. Naive forecast, simple and weighted moving averages, and exponential smoothing techniques are probably the most known applications of such time series methods.

As said, it is very common to have multiple planning and forecasting techniques simultaneously in use. Right methods for planning depend very much on the characteristics of demand pattern. Therefore, choosing appropriate planning methods should always be based on understanding the market demand pattern and customer needs in general.

### **3. Creating agility via Nokia integrated project management**

#### *3.1 Business environment*

The building of cellular networks (e.g. GSM/EDGE or WCDMA networks) is a quite original business. By its nature it is typically a project business, which requires a very structured approach for planning and control, standard procedures and good day-to-day management skills to run the project implementation. Thus, it clearly has many similarities with the traditional construction industry. However, there are some fundamental differences that make the environment much more complex. First, the products are all hi-tech equipment, which are characterized by high product value, extremely short lifecycles and a large amount of embedded software. Furthermore, individual products need to be integrated seamlessly together into a complex system that has to work reliably and securely in all kinds of circumstances. Second, a cellular network forms a multi-site delivery environment, as network elements are located around the country. An average-sized GSM network includes several thousands base station sites, each of which has its specific location, design and function in the network.

Our experiences show that the site implementation process of individual network elements encompasses the customer's demand formation process. For instance, for base stations, the process begins with planning the cellular network and sites of base stations. The next phase is site acquisition, which is to get site permissions for base stations from authorities and make lease agreements with landlords. The process continues with construction works when a particular site is physically built and technical specifications for equipment frozen. After this point, the base station can be delivered to the site. Next, the base station is installed and final commissioning is done at the site. The site implementation process ends when the base station is integrated to the network. Only at this point the investment eventually starts making money for the operator. Therefore, projects' aim primarily is to provide customers fastest time to profit with the investment. This implies that the supply chain should be very agile and equipment deliveries fast and reliable.

By nature, the behavior of market demand is cyclic with some elements of seasonal peaks, typically at year-ends. Although the mobile networks are normally built and

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expanded as well-planned implementation projects, the accuracy of demand planning can be very lousy. In addition to project internal turbulences due to complexity in business environment, there are also many external (e.g. technical, geographical or political) factors that may radically influence on the demand. The level of aggregation and planning time horizon depends very much on products, i.e. the network elements. For instance, for base stations a planning item typically equals to a delivery item and main focus is on a short-term time horizon. Whereas, for mobile switches planning can be done on system capacity level (e.g. number of air channels) and time horizon is typically more long-term. Demand planning is primarily based on the judgment method in separate customer account teams, as sales-forces give best estimates based on information from their own customers. After the demand is consolidated to a global level, some demand adjustments can be made based on executive opinions. Also some quantitative forecasting techniques, like exponential smoothing, are complementarily used for certain products.

### *3.2 Nokia's integrated project management*

Successful network deployment and expansion is about continuously understanding customer milestones. It typically requires fast mobilization of a network of people and companies to perform all the activities, deploying a fast and flexible delivery chain, managing an increasingly complex network of suppliers, monitoring effectively and sharing transparently the status of the operations. Integrating all these in a cost-effective and efficient system of activities, processes and tools is the way to meet those milestones. Nokia's IPM is all about this.

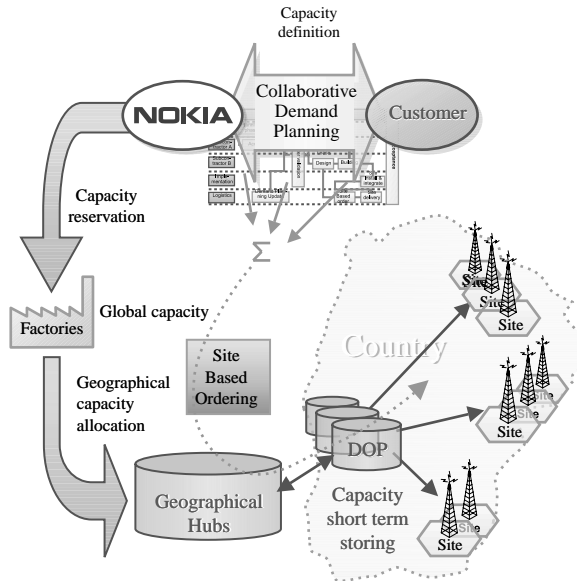
IPM is a strategic execution program to implement a truly customer-focused delivery process in Nokia Networks. Target is to provide customers with more speed, efficient and cost effective deliveries by better orchestrating the end-to-end supply chain. Idea is to seat the customer itself onto the driving seat of the whole delivery machine. Customer's network rollout needs are cooperatively collected as a part of continuous planning process and supply capacity is reserved accordingly to meet project targets. Market responsive supply chain with regional delivery hubs is designed to tackle project uncertainties and to provide high-standard service levels to project implementation teams in all circumstances. Site-based ordering model enables short lead times and allows win-win asset management in the supply chain, as equipment deliveries are triggered based on mutually agreed milestones in the site process. Figure 1 shows the model how this IPM allows fast, flexible and efficient supply chain all the way to final implementation sites.

The program started with creating of key business capabilities through a selected customer pilots. Based on the first pilots following four items were formed and agreed as the IPM capabilities to be deployed for selected customers:

- (1) collaborative demand planning with a customer;
- (2) site-based ordering by project progress;
- (3) professional cost management; and
- (4) performance metrics with integrated platform.

IPM implementation consists of deploying or fine-tuning the key business capabilities for IPM in selected customer account teams. Typical implementation per customer





**Figure 1.**  
Integrated supply chain in  
IPM

takes around half a year during which standard processes and tools with appropriate performance metrics are put in place. “Quality in all we do” is a common ground for all the initiatives taken under Nokia IPM umbrella.

IPM business capability that we merely focus now is the “collaborative demand planning with a customer.” Here, the core idea is to build an agile and responsive supply chain that is fully driven from the customer project front line. During the network implementation project there is one clear interface towards the customer for all operational issues with easier communication and faster reaction. The customer’s project rollout plan is primarily used as a basis for Nokia internal demand plans. Correspondingly, Nokia ensures high product availability, short lead times and reliable deliveries directly to installation sites. Monetary savings to the whole customer’s project are mainly expected to materialize through improved asset efficiency and reduced non-quality costs when building the mobile network.

### 3.3 Demand planning driven by customers’ project plans

Demand supply planning (DSP) is a sales and operations planning process that ensures profitable balance between demand and supply capability. It is a vehicle to understand future sales in volume and money, optimize supply capability, enable calculation of future product and project profitability, and enable estimation of future resources and capital investment needs. DSP incorporates three sub processes: demand planning, demand supply balancing and supply planning. Demand planning is a continuous process in customer account teams to turn customer and market forecasts into executable volume demand plans. Planned volumes are naturally basis for buying components, reserving both production and service capacity and also in longer term making capital investments on company level. Demand planning also directly impacts profitability and cash flow of customer account teams. Over-planning leads to excess stock and decreased operational

efficiency. Under planning leads to reduced customer satisfaction and lost sales opportunity. Effective demand planning is essential to achieve the balance between satisfying customers and running an efficient and profitable business. Therefore, planning is run on continuous basis – monthly, weekly and even daily.

The global planning process is based on 13 months rolling market and customer forecasts that are updated on monthly basis. Demand for the first three months is called short-term plan and it can be updated even every week. Mid-term plan includes demand from 4 to 13 months ahead to the future. Overall, the plans include three different types of planned volumes: committed, non-committed, and market driven volumes. Committed volumes practically comprise of the order backlog, where demand is already specified on detailed product configuration level. In practice, this demand represents delivery plans based on which order and delivery execution is done. Here, the accuracy of plans is crucial, as any discrepancy on item level information may easily lead to inventory build ups or shortages in the supply chain. The non-committed volumes actually mean demand that is included in contracted rollout plans of the customers but not yet materialized into final customer orders. This demand is typically on a site type or an averaged product level. Material buffer levels of the delivery hubs are basically defined based on this information. Last, potential future sales in new prospects are represented in market driven volumes. In addition, existing customers' future investment plans and product roadmaps should also be effectively used to estimate the demand. These planned volumes are primarily used more long-term capacity and investment plans in own plants and with key first tier suppliers.

Ideally, short-term demand plans equal to customer rollout plans. Based on our experiences, in short horizon planning the customer demand should be driven by professional rollout planning in customer projects – regardless which company provides related implementation services. This is because all implementation resources are anyway included in project rollout plans and without the resources it is not possible to install the equipment to the network. Furthermore, based on our experiences rollout plans are almost always agreed and discussed with the customers on a regular basis. It is also extremely important that everybody is using the same language when speaking on the demand, e.g. the same meaning of time scale, similar level of aggregation and same planning entities. When using common rollout plans this aspect becomes naturally right and no additional efforts are needed for alignment between different players in the project.

As discussed, customer's project rollout planning and the progress in site implementation process are the main drivers of demand planning in short horizon. These should not be seen as separate tasks, but they should instead be strongly linked together. It is clear that these project level actions are providing the most accurate information about delivery needs for the near future. Nevertheless, for a bit longer term it has to be underlined that it is not uncommon to have customer headquarters' provided forecasts that are different from the actual rollout needs. Inside customer organizations there can be different owners with different drivers to provide demand information to suppliers. It is a fairly common practice among customers to use data from their regional teams only as inputs to a consolidated nationwide plan, while no feedback is provided to the regions on such plan. Then only an active, continuous understanding of the rollout fluctuations compared to the consolidated nationwide plan can produce the desired level of accuracy. In this sense creating the feedback loop

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in terms of sharing continuously the planned demand with all performing organizations is instrumental in reaching a suitably accurate plan.

#### *3.4 Integrated IT tools enabling transparency*

Integrated IT platform, Nokia IPM Suite, provides a common control room for all stakeholders in customer projects. It is a fully integrated platform to manage the progress of site implementations and support full cooperation among stakeholders. The IPM Suite allows customers to plug and play operations in project's start-up conditions and new project phases, enables integrated management of all the different project activities, provides a common tool for tracking the activities of different stakeholders, helps project progress monitoring by providing a joint virtual "control room" for all performing organization. The integrated IT tools include different modules like rollout planning, rollout tracking, quality tracking, site database and documentations management.

The suite is also linked to the backbone logistics systems providing necessary basis for supply chain agility. Transparency to the information for all relevant project stakeholders (e.g. customer, subcontractors, and partners) is guaranteed through e-project management portal. Full details on each site activity and real time update of the project status are visible online. Also project progress, site quality, and activity tracking are all available online. Documentation exchange and proper management of thousands of site folders is likewise possible in the system.

The tools provide needed transparency to the information for all parties. It is especially important upstream for planning purposes when creating agility into operations. However, it is still good to remind that the tools do not improve the quality of demand information but only can automate data handling and sharing.

#### **4. Lessons learnt from collaborative planning**

Based on our experiences an agile supply chain is a basic competitive requirement in the industry and building agility into operations requires continuous planning process together with customers. Owing to intensive market dynamics in mobile operator markets, it is difficult also for the customers to predict the future. Proper forecasting process generally requires excessive focus in customers' organization. Also cultural issues and contractual clauses with certain customer may increase this difficulty. By nature forecasting is challenging and there are only a handful of customers who are really committed to accurate forecasts. It is, therefore, why true process collaboration with all stakeholders participating the mobile network deployment and expansion is so crucially important. The consolidated demand plan is shared in a continuous manner with all the organizations contributing to its fulfillment. Continuous planning is practically the only way to make supply chain for effective and efficient.

It seems that for common rollout planning is the most natural way for the customers to share future demand information between the supply chain players. It is also fairly obvious that a properly set-up and duly maintained rollout plan is the most reliable source of data for the volume demand plan; only in cases where this link is really ensured we see positive results in terms of customer's forecasting accuracy. Everybody understands that in this business environment a request for detailed demand plan many months ahead cannot be very realistic. Therefore, rollout planning is mainly to tackle short horizon and not touching demand beyond three months ahead to the future.

Rollout planning using collaborative IT applications is bringing the much needed formalization to the process, for instance ensuring that project data is continuously captured into demand plans. To enable correct demand planning the customer has to be involved in the process; to achieve the maximum benefits from the process the customer has to be committed on planning on a site-based basis.

Customer collaboration should happen throughout the whole organization, on all levels. At headquarters' level for demand created in the top-down manner while at projects' regional level in bottom-up. Despite potential discrepancies in the information, suppliers should be able to utilize the consolidated demand. Sharing the consolidated plan back to the customers in a transparent manner has proven to be facilitating the process and increasing the reliability of the plan itself. Key point is that collaborative planning should be seen as a process of continuous development that will systematically improve itself in the course of time.

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