EyeOn bv
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Responsive Forecasting and Planning

in the High-Tech and Electronics industry

Planning & control solutions in leading organisations

An EyeOn white paper

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Responsive Forecasting and Planning

in the High-Tech and Electronics industry

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Our special recognition goes to the members of the high-tech and electronics network. The white paper reflects the findings of interviews with the 21 participating companies.

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Summary

Over the last few years forecasting and planning in the high-tech and electronics industry has become ever more challenging. Companies are spending considerable time and resources improving the quality of the forecasting and planning processes and hence the quality of the output.

With this in mind EyeOn has launched a knowledge network where companies in the high-tech and electronics industry share experiences and best practices. As a starting point for this network interviews have been conducted with all participants to determine the current status in the industry.

High levels of demand and supply uncertainty call for planning processes that allow for focused decision making (efficiency) based on unambiguous information (information transparency) with room for frequent revisions of plans using the latest insights available (speed). In the light of this collaboration (as well internal as external), new product planning, the reduction of political behaviour driven by target setting or bonus schemes, the involvement of marketing and sales in the forecasting process and the availability of robust decision support tools were mentioned by the participants as most significant. Based on the interviews some key implementation principles are discussed that can guide the implementation of responsive forecasting and planning processes.

Introduction

Planning and forecasting are at the very heart of the business processes of most industrial companies involving a variety of functional areas such as marketing and sales, finance and logistics. Forecasting and planning has been recognized by practitioners and academics as a key element in supply chain management. Over the last decade, companies have engaged in various improvement programmes in this field. According to Aberdeen 70% of the respondents to their survey indicated that they are actively engaged in enhancing their existing sales and operations planning capabilities (Aberdeen, 2004).

Whereas ensuring good planning and forecasting is far from trivial in most business environments, there are few industries more challenging than the high-tech and electronics industry. On the one hand, the market for consumer electronics and communications is characterised by cyclical demand patterns with high levels of uncertainty, short product life cycles, prices that are constantly under pressure, changing distribution channels and ambiguous forecast information. On the other hand, the same market must be supplied through long, fragmented supply chains with high pressure on capacity utilization and a difficult time-to-volume process.

This paper identifies the key developments in the business planning processes in the high-tech and electronics industry and provides a framework for a responsive forecasting and planning process to deal with the specific dynamics in this industry. Besides literature, information has been gathered via explorative field research; this consisted of several structured face-to-face interviews with large, multinational companies. The interviews were conducted between March and June 2005. Since representatives from various parts of the value chain participated, good insight into the specific forecasting and planning issues throughout the industry could be achieved. The results of the questionnaire were presented in a meeting with the participants in June 2005. After this the draft of this white paper was distributed to the respondents for comments. These comments have been included in the final version of this white paper. The first section discusses the industry dynamics that puts high demands on forecasting and planning. The second section highlights the 5 key improvement areas in this field for the high-tech and electronics companies, as can be concluded from the interviews. Those 5 improvement areas have in common that they underline the need for responsive forecasting and planning processes, the three key aspects of responsive forecasting and planning processes are described in section 4. The last section shows how a responsive forecasting and planning process can be implemented.

Therefore the white paper provides insights into the main industry challenges and answers the question how to develop and implement efficient and effective forecasting and planning processes. The structure of the document is shown in Figure 1.

Participating companies:

Apple	LG.Philips Displays
Arrow	MediaMotion
ASML	Navteq
ASM international	Omron
Assembleon	Philips Consumer Electronics
Canon Europe	Philips Semiconductors
Dell	Solectron
Ferro	STMicroelectronics
Flextronics	Thomson
Freescale	Vodafone
KPN Mobile	

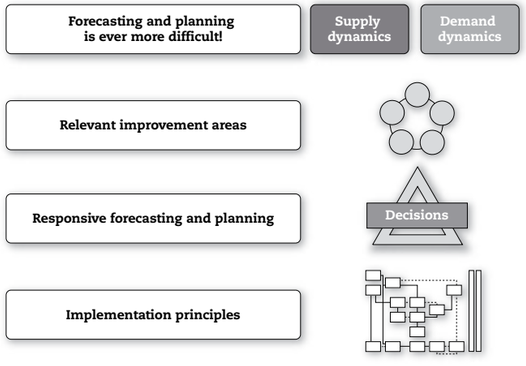


Figure 1. Structure of the document

Industry dynamics

"Forecasting and planning is ever more difficult"

Over the last decade televisions, mobile phones, computers have entered the homes of billions of people. The integration of several products into home networking and into connectivity applications has rapidly become common practice. As a result, many players have entered the electronics value chain. An overview of the value chain and some of its main players is shown in figure 2.

In this section we will elaborate on the results of the EyeOn survey which revealed the main trends on the demand and on the supply side.

Demand trends

A component supplier:

'For most customers the sales force has hardly any idea of their sales forecast'

Many companies across the total high-tech and electronics value chain have difficulties in predicting changes in their demand. About 70% of the interviewed companies in the EyeOn survey believe it is important to improve their forecast. The importance of a reliable forecast is reinforced by the diminishing order book visibility of many companies. The difficulty of generating a demand forecast is explained from the strong cyclical demand, the high demand variability, short product life cycles and a high rate of technological renewal, strong price erosion and changing distribution channels.

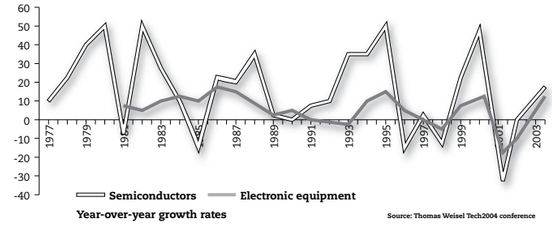


Figure 3. Demand cycles in the high-tech & electronics industry

Cyclical demand

The back-end of the supply chain has to face up to huge fluctuations in their longer term demand cycles. In figure 3 the year-over-year growth rate in the worldwide semiconductor industry and the growth rate for the electronic equipment manufacturers are shown. Large up and downswings make forecasting a challenging, yet from a profit perspective very important activity.

Demand variability

Research (Wacker and Lumus, 2002) shows that the high-tech & electronics

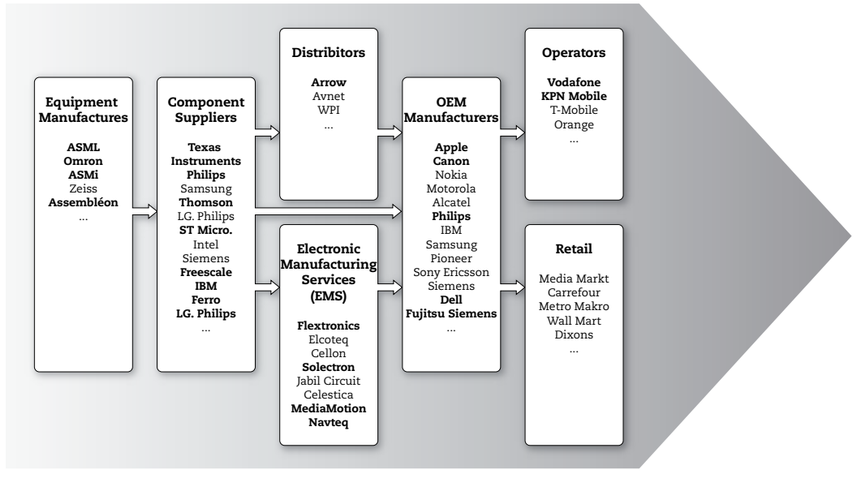


Figure 2: The high-tech & electronics value chain

A component supplier:

'Until a year ago the seasonal pattern was relatively easy to predict. Over the last 6-12 months this has also become unpredictable.'

industry is among the top-3 industries in terms of demand variability. Demand variability (variation of demand within a given period, e.g. seasonal pattern) combined with cyclical demand (variation of demand over a larger timeframe) results in a very volatile demand pattern. It has been stated by many participants that these patterns have become harder to predict over the last 5 years.

Short product life cycles and technological renewal

After a relatively long stable period of several decades, the consumer electronics industry currently finds itself in a stage of radical change. Technological developments, mostly based on digitalisation of images and sound, take place in quick succession and rapidly find their way into new consumer applications. No industry is characterised more by the introduction of new products and technologies than the high-tech and electronics industry. The high rate of new product introduction is translated all along the value chain. In this respect, semiconductor companies tend to have a greater number of products in development at any given time than other industries.

An operator:

'Product Life Cycles of mobile phones are getting shorter and shorter'

Strong price erosion

More and more consumers are replacing their analogue VCRs and cameras by new digital equipment such as DVD players and high-definition televisions. But with new features being introduced every few days price erosion is a serious concern for retailers and manufacturers alike. For planning not only volumes, but also prices and margins play an important role.

A component supplier:

'In the consumer-market "price" is getting more important for the consumer than "brand"'

Changing distribution channels

Often, the abovementioned new product offerings are not 1:1 replacements of the traditional products. Applications are combined into new image and sound products. Moreover, hardware is often combined with software, content, services and other hardware offered by third parties in one consumer offering. The radical change in the product offerings also has a huge impact on the consumer trade channels in this market. Strengthened by more general trends in retail, like internationalisation and up-scaling, the position of traditional specialists' channels weakens in favour of new, upcoming channels such as hypermarkets, discounters, new specialised channels in digital products arising from early PC retailers, service providers that sell the devices as part of their service and OEMs and retailers selling their products directly through internet.

An OEM:

'Strong trend towards providing total solutions rather than individual products. The related network solutions are purchased from third parties'

The EyeOn survey shows that also more upstream in the value chain distribution channels are changing, most notably in the components market. Demand and supply are increasingly matched through internet bidding.

Consequently, suppliers nowadays have to deal with a variety of channels with different pricing, discount structures and demand patterns. Moreover, most new channels are 'promotion driven', which shifts demand patterns from retail stock replenishment to a more batch, promotion- oriented nature.

Information distortion by changing supply chain structures

OEM manufacturers like Nokia, Ericsson and Philips outsource large parts of their production to Electronics Manufacturing Services (EMS) such as Flextronics, Solectron and Jabil, thus adding an extra tier in the value chain, and therefore adding more complexity in determining the forecast. As recently as 10 years ago, vertical manufacturing strategies were still the rule for manufacturers of high-tech technology electronics (Accenture, 2004). Over the last decade EMS manufacturers have captured a substantial part of the market. The EMS industry continues to evolve through OEM divestures, alliance partnerships, and merger and acquisition activity, which proliferates the number of supply chain solutions available today. The resulting supply chain fragmentation induces the distortion of information flowing up and down the supply chain, thus causing the so-called bullwhip effect.

A component supplier:

'EMS is not able to get a clear total overview of demand; OEMs are now taking back some of the "power" to get more grip on e.g. prices'

Supply trends

In situations with high uncertainty, complex value chains will lead to increased vulnerability and will prove to be a business risk. A number of business trends that increase vulnerability to risk in chains can be identified in the high-tech and electronics industry. In this section the major trends are elaborated on.

Global transfer of product development and manufacturing

Manufacturers seeking to exploit global markets, supply chain, and engineering opportunities are increasing complexity across the value chain. A Deloitte study shows that 37% of Northern American manufacturers and 31% of the European manufacturers consider locating new production facilities in the next three years in China (Deloitte, 2004). This can be added by the fact that a large part of component supplies are already sourced from Mexico, Eastern Europe and the Far East. Nearly half of the manufacturers (48%) also engineer products outside their home region. As a result the task of co-ordinating product engineering, manufacturing, logistics and marketing and sales activities that are scattered around the world becomes difficult; forecasting and planning plays a pivotal role in this.

An EMS:

'Production is increasingly transferred to low-cost countries in Eastern Europe and the Far East, thus increasing supply lead-times significantly'

Also the participants in the EyeOn knowledge network indicated that there is a strong trends towards transferring production to low-cost regions, most notably the Far East. Because of the low costs the installed capacity base can be larger, thus creating volume flexibility advantages. The downside, however, is that lead-times have increased dramatically, which makes the supply chain more vulnerable for unexpected demand variations.

Complex supply chain relations

The strong emergence of EMS has added an extra layer in the supply chain. At the same time OEM's outsource more and more activities in the ever shorter Product Life Cycle (see Figure 4).

According to participants in the EyeOn knowledge network, there is indeed a move to more outsourcing throughout the value chain. When outsourcing, the trend is to have fewer suppliers covering more activities. With these suppliers more intensive partnerships are set up. Companies struggling with the problem of trying to remain 'in the driving seat' when many activities are not

An OEM:

'Contract manufacturers are moving towards product design'

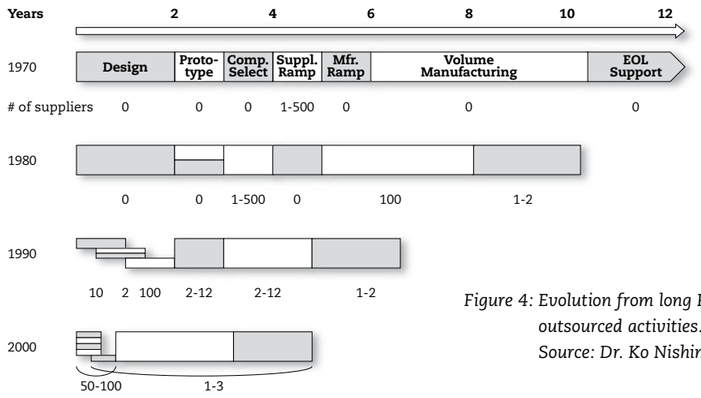


Figure 4: Evolution from long PLCs towards very short PLCs with outsourced activities.
Source: Dr. Ko Nishimura, MIT 2001

done in-house. This is complicated by the fact that responsibilities are not always unambiguously allocated and often determined by historical relations between the parties

The trend of outsourcing is partly responsible for the high variety of players in the high-tech and electronics landscape. These companies are connected in a network rather than in distinguishable chains. An example of a company facing complex relations in the high-tech and electronics value chain is Samsung; a major supplier of ICs that also sells consumer electronics containing chips from its IC competitors such as Sony and Philips.

Pressure on capacity utilization
Typically, capital investments are large further up the value chain. As an example Crolles 2, a joint venture between ST Microelectronics, Philips and Motorola required an investment of USD 2,35 billion. Strategically, the success of manufacturing organisations is tied to the effectiveness of the link between the forecast and the resource allocation plan. Given the time horizon for these capacity decisions and the vast demand uncertainty, scenario planning is compulsory.

Difficult time-to-market and time-to-volume
In a market dominated by continuous technological innovation and short product life cycles, the player launching a new product first, i.e. the player with the shortest time-to-market, has a serious competitive advantage that will be difficult for its competitors to make up for. However, to leverage this head start it is just as important to be able to upscale the supply of a new product to levels of mass production rapidly. If a company does not manage this so-called time-to-volume properly, it may find itself left behind empty-handed while the competition capitalises.

Unfortunately, the early stages of the production of a new product in the high-tech electronics industry are often of an engineering-like nature featuring low yields and long lead- times. This causes significant supply uncertainty. Moreover, it often proves to be very hard to configure a supply chain that enables a reliable mass supply of products after the introduction stage. An example is the launch of imaging features for mobile phones by Motorola which was seriously hampered by the worldwide shortage of a critical chip (Forbes, 2003). Also Sony had difficulties in satisfying consumer demand for their new PS2 consoles while at the same time the older PS2 systems had already been phased out (Gamespot, 2004).

An equipment manufacturer:

'Especially in an up-market, the variability of supply lead-times increases significantly'

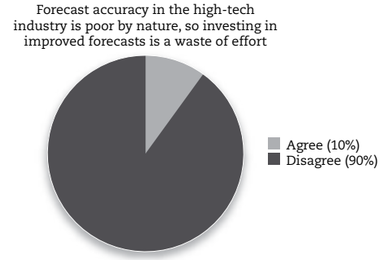
Conclusion

Demand in the high-tech and electronics industry turns out to be volatile and difficult to predict. On a macro level this is due to the significant cyclical demand pattern and on a micro level the ever shorter product life cycles, decreasing price levels and strong proliferation of distribution channels play an important role. At the same time outsourcing to Electronics Manufacturing Services adds extra tiers in the supply chain, inducing distortion of demand information.

Supply uncertainty is very much driven by the constant search for efficient methods of gaining competitive advantage by moving production to low cost regions and using contract manufacturers. Furthermore, companies have difficulties in setting up supply chains that are capable of timely and stable upscaling of the supply of new products.

What should a company do when faced with such fierce industry dynamics? If accurate information is available about future demand and if this demand can be fulfilled by a highly reliable supply, it pays to create a production plan that is optimised for costs or service. Very often this is the case with basic commodities. On the other hand, if supply is not reliable but demand is highly predictable, an extra inventory buffer can often be carried, based on an accurate forecast, without much risk of obsolescence.

But how to organise the business planning process when both supply and demand are uncertain? Uncertainty and complexity can be mastered by implementing flexible value chain solutions, by reducing manufacturing lead-times, increasing supply flexibility or by implementing modular product development. This was also recognized by the respondents. Most of them are involved in adopting more flexible supply chain models. But, as was also recognized, in an industry that is to a large extent characterised as make-to-stock situations, forecasting and planning are still of eminent importance. From the questionnaire



it became clear that although the forecast accuracy in the high-tech industry is poor by nature, investments in improving forecast accuracy were not perceived as a waste of effort.

What is happening in this field at the moment is outlined in the following section and the 5 most relevant improvement areas are elaborated on.

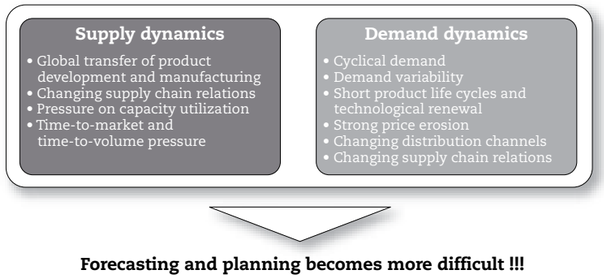


Figure 5. Summary of industry dynamics

What is going on in forecasting and planning?

"Relevant improvement areas"

From theory and practice many different initiatives to improve planning performance are known (for an overview of these initiatives see e.g. Aberdeen (2004), Moon et al. (2003), Hacket (2003)). In the interviews these topics were discussed with the respondents:

- *Integration supply chain planning with financial management (budgets, rolling forecasts)*
- *Consensus forecasting*
- *Customer visibility*
- *Price management and forecasting*
- *Promotion planning*
- *New product planning*
- *Application based forecasting (kitting)*
- *Supplier collaboration*
- *Customer collaboration*
- *The use of key value drivers*
- *Incentive schemes*
- *Data management and decision making*
- *Scenario planning*
- *Strict scheduling of forecasting and planning activities*
- *Process ownership*

The respondents scored on all topics for perceived relevance (from totally not relevant to extremely relevant) and indicated their current status and vision regarding these subjects. The possibility was also offered to add extra initiatives to the list. It was concluded from the interviews that the list of topics as presented was perceived to be exhaustive and no additional topics were added.

One of the objectives of the research was to determine those practices that are seen by the participants as most relevant for the improvement of forecasting and planning performance in the high-tech and electronics value chain. Across the entire chain 5 forecasting and planning themes are recognized as being important for the coming years. For these themes, shown in figure 6, the average score on relevance was 4.2 on a scale from 1 to 5.

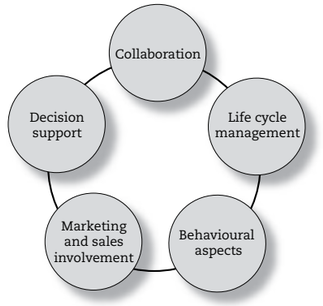


Figure 6. Key themes in Forecasting and Planning in the high-tech and electronics industry.

Collaboration

The integration of plans over different entities and different functions is rated as a vital improvement area. The seamless integration of planning processes of different functions is a source of concern for business management. Numerous are those occasions where managers are confronted with differences between forecasts of the sales force, logistics estimates of the future and the annual-based forecasts of the finance department. In order to perform, every company has to integrally manage its functional objectives. This can only be established when the key functional planning processes are aligned into one multidisciplinary business planning process. One planning heartbeat, involving all relevant functional areas with their functional responsibilities in one planning process around one set of shared targets:

- Supply chain management / logistics, responsible for supply demand balancing, translating demand into supply, production and purchasing plans.
- Marketing & Sales, optimising sales and market shares by creating and developing markets, grabbing sales opportunities and managing customer demand.
- Product development, incorporating new technologies into product offers and in time market introductions.
- Finance, managing margins, profitability, returns on assets and EVR.
- Procurement, steering the availability of components and products purchased at market conditions.

A study conducted by Mentzer and Kahn found that over half the companies that they surveyed (478), were trying some type of negotiated or consensus-based forecasting approach and that these companies were more satisfied with their results (61 to 69.8 percent described themselves asforecasting approach) (Mentzer and Kahn, 1997). Also other cases presented show large satisfaction in applying the "one number" planning approach.

A component manufacturer:

'collaborative planning is currently applied for one customer on application level; requires a lot of operational adjustments but results in a lot of flexibility and reduction of other activities'

The concept of information sharing across the boundaries of one's own company has received much attention over the last years. This information sharing takes away the risk of unexpected demand spikes that originate from actions (promotions, product introduction, volume increases) taken by one party without properly informing the other value chain partners. In an ideal world, supply chain partners would work together to rethink and restructure business practices to provide consumers with products and services better/faster/cheaper than ever before. For the collaboration with other supply chain partners companies involved in the survey embarked on programmes to involve customers and/or suppliers in their planning process. This ranges from rather 'simple' concepts such as Vendor Managed Inventory concepts to models surpassing the exchange of information between the business partners by joint decision making. Although the concept of collaborative forecasting and planning has been known for several years collaborative planning projects in the high-tech and electronics industry only take off at a relatively slow pace. It is defined by many companies as the preferred way the companies should work, but only a limited number of companies actually started to implement individual initiatives. These isolated initiatives were generally not part of an overall end-to-end collaboration strategy plan. The obstacles surveyed were not only related to trust but also to the individual capabilities and the maturity of the respective partners' internal processes. The cultural aspect provides an extra dimension complicating the installation of collaborative forecasting and planning programmes.
E.g. A component supplier from the survey only accomplished to start a small project with their Taiwanese customer after a long period of exploring each other's intentions and capabilities.

Life cycle management

With the ever increasing pace in which new products are introduced, forecasting of these introductions becomes a major challenge for the companies in the high-tech and electronics industry. Different strategies are applied to forecast new products. E.g Motorola forms a specific cross-functional product introduction team that manages the phase-in of the new model and also, if required, the phaseout of the old model. One of the OEMs has used a very small central dedicated team to forecast the new product demand via a separate, dedicated process. At the moment it enters the short term planning horizon this information is deployed to the entire organisation. Other companies have used statistical forecasting techniques from the apparel (clothing) industry to forecast the success of new product introduction. A telecom operator has decoupled the new product introduction planning from the 'regular' sales forecasting process with

An operator:

'The planner can now have a more critical view of new introductions (is more formalized): if there is still a lot of stock of the old version left the introduction might be delayed.'

devoted teams and processes, procedures and tools. All companies involved are seeking ways to improve this process, very often combined with managing the phasing out of 'old products'.

Marketing and Sales involvement

A component manufacturer stated during the interview that "currently there is not much accountability for the forecast at Marketing and Sales. But we are developing a plan to place ownership back with the sales team." Having sales taking ownership of the forecast, sticking to strict time schedules and delivering high quality forecasts is seen as a major challenge by many of the participants. In support to this a study in 33 companies (Moon and Mentzer (1999)) showed that in nearly all of the companies involved there was a resistance from sales people regarding their forecasting responsibilities. Many sales people felt that it was simply not their job to forecast. A common understanding was that time spent doing forecasting was taking time away from their 'real jobs', which is calling on customers and selling products and services.

Behavioural aspects

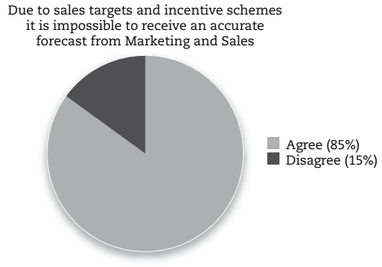
The prevention of structural over and underestimation in forecasts (sandbagging vs. conservatism) is often related to the target setting and reward structure. Many companies reward by a combination of a straight salary and bonuses. By including both a fixed monthly wage and a sales percentage management seeks to secure company control and to motivate staff. However, this way of remuneration can be damaging for the attention paid to the forecast. An alternative is that part of the bonus depends on the achievement of a sales budget agreed upon. This strongly encourages gaming the system. First, a manager may manipulate the setting of the budget by withholding information about what he or his unit could really achieve, thus distorting the information flow. Then he can start playing games by increasing this year's earnings at the cost of next year's, or the other way around when the budget for this year is out of reach. All well known and non-desired actions (Jensen, 2002). However, to make sales aware of the importance of the forecast and focus attention on obtaining a valuable forecast, accuracy should be at least partly included in their bonus scheme.

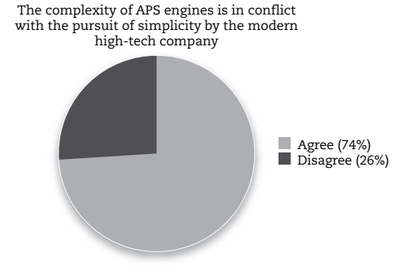
An EMS:

'OEM X seems to apply sandbagging in its forecasts, because it is easier to quickly ramp down production than to ramp up'

Decision support

Data collection and preparation activities are often found time-consuming and cumbersome activities. On average a planner spends 50% of the time on data gathering instead of data analysis. Ranging from 20% for the best-in-class company to 80% for other companies. This despite many large ERP and APS implementations within the survey group. Large investments in systems such as SAP, i2 and Manugistics seem not to pay off in the area of forecasting and planning. A study conducted by Nucleus Research (2003) indicated that of the 22 companies interviewed 55% did not believe they achieved a positive Return on Investment (ROI) from their i2 deployment. One of the key disadvantages mentioned was the large amount of data gathered and the sometimes very complex algorithms proposing plans that were not comprehensible for the planners. Planning very often turns into a process that has a discussion on data and its correctness instead of making the right decision. Some of the participating companies have built tailored data bases to collect data from the ERP systems to support the planners in executing their job and reducing the number of non value adding activities.





An OEM:

'We stopped the implementation of i2 MP for our supply chain planning because it did not fit our requirements. Instead, planning is done in an Excel application which is now standardized worldwide.'

Two other subjects, scenario planning and kitting, also scored high on relevance, however, only in a limited part of the chain.

Scenario-based planning is especially important for the equipment manufacturers further upstream. They are confronted with severe, unpredictable demand fluctuations. To be armed against these fluctuations they apply scenarios in their planning process.

For component suppliers providing complete solutions (kits, applications) becomes ever more important. If one gets further down the value chain the relation towards the view of the real consumer demand for a real product is lost. Typically the "real product demand (e.g. mobile phone type XYZ, PC type ABC, TV 123) is translated by the manufacturer into dependent demand for the individual components. The demand for these components is handed over to the parties further down the chain. Leading component suppliers are moving away from planning individual components to planning finished products and derive their components demand via a bill-of-material from the finished products demand. In those cases where suppliers provide the manufacturing site with multiple components ,it enables them to provide complete kits or sets of components.

An additional advantage mentioned is that the value or volume of the forecast can be compared with the market size to determine market shares to validate the quality of the forecast. In many companies it turns out that the current ERP and APS systems are the bottleneck in forecasting the application. From a systems perspective this means that a third dimension alongside the customer and product dimension has to be added. Very often this turns out to be a cumbersome or even impossible process.

In this section key improvement areas are identified for the high-tech and electronics industry. Many of the initiatives discussed reflect the quest of the companies to implement responsive forecasting and planning processes to be able to cope with the dynamics in the industry. The following section gives a general overview of what determines a responsive forecasting and planning process.

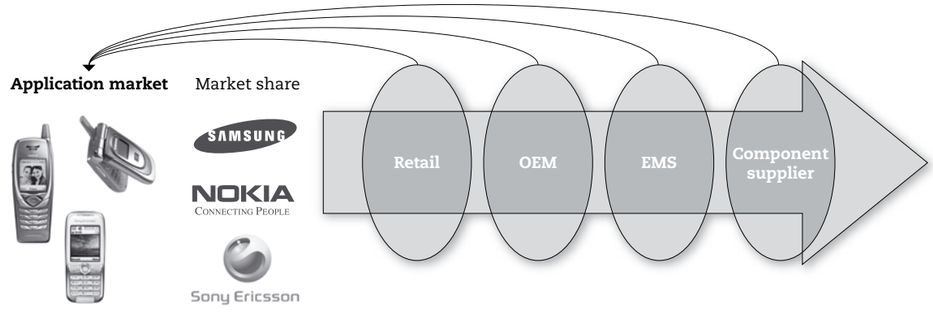


Figure 7. Application / kit driven forecasting

Responsive forecasting and planning

"What determines the set-up of forecasting and planning processes?"

The fundamental purpose of forecasting and planning is to enable accurate decision making.
Forecasting is estimating some future event or condition which is outside an organization's control and provides a basis for managerial planning. Organizations forecast so that they can plan and help shape their future. Forecasting is a crucial input for planning in almost all companies. Forecasts are major components of the business decision-making process.

The decision-making process can be decomposed according to the horizons considered (Gupta and Maranas, 1999). A very common classification is to separate decisions into strategic, tactical and operational decisions.

Short time frames over which production scheduling, sales order management and inventory management are addressed, characterise operational planning. In general the degrees of freedom for management to really change the course of the company is limited, the focus is to optimally use the installed infrastructure to satisfy customers.

Typically, decisions taken in the strategy planning process have a longer-term focus and concentrate on the markets the company wants to compete on, technologies, customer priorities, required organisational set-up and required investments in the company's infrastructure. The impact of strategic decisions can only be seen in the longer term.

Decisions on the tactical horizon are related to the question if the company is still on track for its strategy and if corrective actions are required (Figure 8). This is related to the development of the market where the company delivers components in, the status of development projects, potential business scenarios, customer plans and resource/capacity adaptation. In a highly volatile cyclical market the outcome of this process largely determines a company's success. In this planning cycle decisions have to be taken on resource allocations such as: are engineers working on the correct products, are correct customers being targeted, are correct capacities installed in manufacturing sites, are correct promotions planned, does this deliver the expected financial value.

Decisive in the set-up of responsive forecasting and planning processes is that **information transparency**, **speed**, and **efficiency** are achieved.

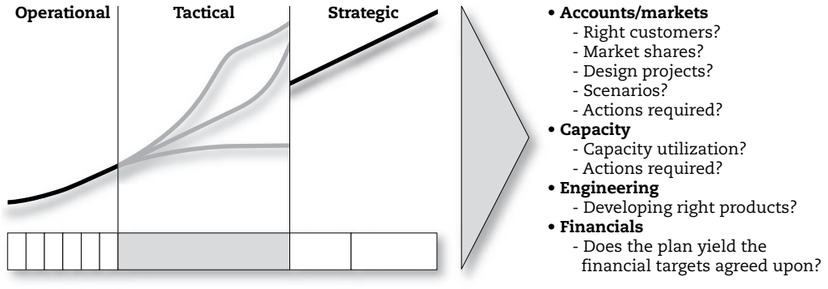


Figure 8: Tactical planning as the link between operational planning and strategic direction

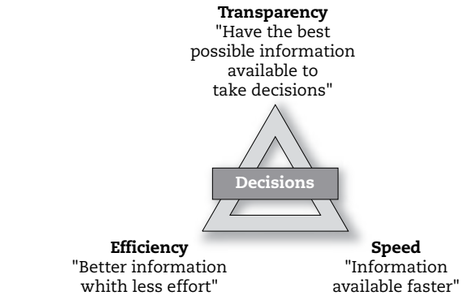


Figure 9. Key drivers responsive forecasting and planning

Information transparency

"Have the best possible information available to take decisions"

Information transparency is about sharing relevant information in order to reduce information distortion, both between different functions in the same organisation and between supply chain partners.

A component manufacturer:

'The largest improvement can be achieved by transferring the demand signal without disturbances and distortion through the chain'

Traditionally, planning processes in and between companies are characterised by functional areas such as marketing / sales, logistics and finance working in isolation using their own information sources and assumptions. At the same time sharing demand forecast information has been recognized as a key element in supply chain coordination (Cachon, 2001 and Lee, 2004). The demand from the final customer drives the entire chain. Each of the links in the chain acts in reaction to the actual or anticipated demand from the customer at the end of the chain. The seamless transfer of relevant forecast information throughout the chain is one of the key drivers in the high-tech and electronics industry to limit information deformation and hence support better quality decision making.

Efficiency

"Better information with less effort"

Efficiency refers to the need for a process that enables the relevant operational, tactical or strategic decisions to be taken with minimum effort.

An equipment manufacturer:

'In all processes there is a constant pressure on reducing costs'

In many situations the information used in all planning processes is determined by the least denominated number. The level of information gathered is very often at the product /customer-site level for execution purposes, this level of detail is also used for the mid and long-term. Partly this is the case because the systems allow it to be done, and secondly because in many companies the sole objective of forecasting has been lost (taking decisions). In many companies forecasting, also for the medium and long term, has become a number crunching activity. When information for the short term planning process is gathered at product and customer level for the first 6 months, this level of analysis is generally also used for a longer time frame to take tactical and strategic resource decisions, by extending the horizon in the ERP and APS systems simply to 12 or 18 months. However, the nature, level and time buckets (quarters instead of months) of information required are really different for that time horizon. Other dimensions, like scenarios and market share information tends to be more meaningful on the longer horizon.

Speed

"Enable more frequent decision making"

The requirement for speed is related to the fact that the world is always changing, especially in the high-tech AND electronics industry. This may cause the assumptions on

which yesterday's decisions were taken to be no longer valid today. It should therefore be possible to revise plans on a frequent basis using the latest information available. This can only be achieved through a planning process with a short throughput time where relevant information is disseminated to the relevant people at the moment it becomes available.

An OEM manufacturer:

'Planning horizons are getting shorter, quicker reaction is required on changes in demand, the more often you review the plan the closer you will play at the ball'

By significantly reducing the throughput time of planning processes it becomes possible to define and take corrective actions on a more frequent basis, allowing companies to follow demand patterns more closely. This can only be achieved when the process is highly simplified and only those decisions are taken into consideration relevant for the process.

Conclusion

The set-up of a responsive forecasting and planning process should be based on the objective of this process, i.e. decision making. This may seem a trivial statement, but in many organisations planning has been reduced to a time-consuming number crunching activity that yields results that do not fit their purpose. The determining factors for a successful forecasting and planning process in the high-tech electronics industry are information transparency, efficiency and speed. In the next section a model is presented that can guide companies in implementing responsive planning and forecasting processes.

Implementation principles

"The implementation of responsive forecasting and planning processes"

The interviews indicate that for developing processes with a high level of information transparency, efficiency and speed a focused approach is required. In this section a 6-stage model is presented that can be used as a starting point by practitioners for notions and discussions on typical changes in forecasting and planning processes.

In the remainder of this white paper the 6 steps will be explained in more detail. This description is based on the interview results, literature review ((Lapide 2004), Moon et. al (2003)) and the professional experience of EyeOn consultants.

1. What decisions have to be taken?

The level of decisions (strategic, tactical, and operational) determines the way the forecasting and planning process is organized. Companies in the high-tech electronics industry have to restrict the throughput times of their planning processes to an absolute minimum and, at the same time, manage their key value drivers in an interdisciplinary way. For example, in a semiconductor company that manufactures and sells Application or Customer specific ICs (ASIC) the design-in of the IC into a specific application drives future business. Instead of asking the account teams to forecast the individual components the focus should be on forecasting the design projects with the key customers. Each company should therefore conscientiously define its Key Value Drivers as basic starting point for designing its planning process. This also keeps the sales people focused on those forecasts where they can make a significant contribution to the companies' overall forecasting effectiveness. In a business model where the largest part is driven by promotions it makes no sense to ask the account manager to forecast all the products for his accounts. He should focus on forecasting and planning his promotions, regular business can be forecast via alternative techniques, for example using statistical forecast models. In general it can be stated that a very careful evaluation should be made on what to forecast and not to run into the trap of forecasting each and every individual item.

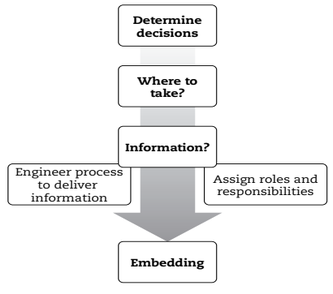


Figure 10. The implementation of responsive forecasting and planning processes

2. Where will these decisions be taken?

Formalize the decision structure in a cross-functional meeting. A key aspect of a planning process is that it is comprised of routine meetings that are held on a periodic basis. In terms of frequency companies in the high-tech and electronics industry should create the possibility to hold these meetings outside the regular process. This is required when large changes in demand become known in between cycles. This can be because of new promotions, spot deals, unexpected upturns, etc. For these meetings to be routine, they should follow a fixed agenda. Closure need to be established at the end of every meeting, for those issues that are not resolved a clear organisational escalation path needs to be defined.

Participants in the meeting have to make decisions on the plans and the forecasts. Therefore, they need to be empowered by the executive team to make decisions based on their beliefs and interactions with other participants during the meeting. While this can be accomplished by holding meetings that involve senior managers such as SVPs and VPs, most company executives empower their subordinates to attend the meeting on behalf of their department and to take decisions they will support.

3. What information is required to take these decisions?

Identify what information is required in the reconciliation or consensus meeting to be able to take the decisions identified. In a second phase it can be identified where this information resides and who is responsible for maintaining the information. Key in this is that only one person is responsible for each data element.

Data collection and preparation activities are often found time-consuming and cumbersome; this also is true for many companies that have implemented ERP and APS systems. As a result a planning meeting very often becomes a meeting that has a discussion on data and its correctness as its main subject. Automate as much as possible, check, correct. Assign clear responsibilities. Make sure that all data collection is finalised and agreed when decision making starts. For the decision making a snapshot is taken from the operational planning systems at a moment as close as possible to the moment the decision meeting is held. Corrective actions agreed on in this decision meeting are transferred to the operational planning system.

4. Assign roles and responsibilities

A clear communication on who owns and can be held accountable for what part of the forecasting process leads to an increased commitment to a sales forecast. This includes sufficient commitment of resources to training, documentation and reward and recognition programmes.

5. Engineer the process

When it is known what decision has to be taken, where the information has to come from and who is assigned to provide the information the detailed process can be designed. Very often this is represented using the so-called swimming lane diagrams. See figure 11.

Short planning cycles can only be established when a strict planning calendar is prepared for all activities. Top-management needs to stick to this, without exception. Personal compliance to this schedule should be measured and reported for every staff member involved, if possible related to personal remuneration. An important element of this strict scheduling is the installation of an alignment meeting involving all disciplines involved required to make the relevant decisions and to deploy required corrective actions. Every activity should strictly be scheduled in the Plan-Do-Check-Act (PDCA) cycle.

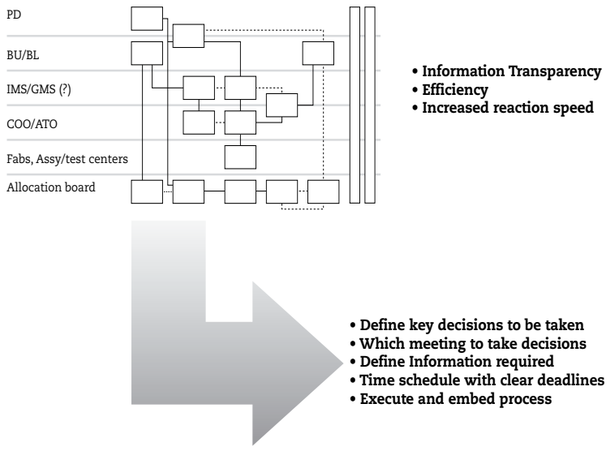


Figure 11. Backward engineer the process

6. Embed process and system in the organisation

Planning over several functions or even organisations requires the involvement of all those disciplines. As stated earlier a strict scheduling and a disciplined adherence to this time line is key for the success of the process. Many companies have integrated their core processes combining related activities and cut out those activities that do not add value. Only a few companies have also changed the way their organisation is managed. The power still resides in vertical units, sometimes focused on regions, sometimes on product or functions. The combination of integrated processes and fragmented organisations has led to confused and conflicting organisations. Especially in the area of forecasting and planning this leads to undesired outcomes, where people still have the possibility not to follow the strictly scheduled process because of functional reasons.

Leading companies have appointed a senior manager as process owner or champion for the entire end-to-end business planning process. To make it successful the process owner must have a clear responsibility over the development of the process and the measurement of the success. For many companies this is a real breakthrough because it separates the control over work from the management of the people who actually perform the work (Hammer and Stanton, 1999).

Like any other process the performance of the planning process should be measured so it can be improved in a continuous improvement cycle. Most companies tend to measure forecast accuracy which is probably the most widely used indicator. However, other metrics such as process throughput time, number of judgement points, data completeness should also be tracked over time. Companies should also assess the forecast accuracy in terms of its impact on business performance. Improvements in forecasting require investments, both human and financial, and should be approached on a return on investment basis.

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