Original Article

Estimating benefits of Demand Sensing for consumer goods organisations

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Dimitris Folinas

holds a Ph.D. in e-Logistics from University of Macedonia, Greece and is an expert in e-logistics, e-supply chain, enterprise information systems, logistics information systems, integration of information systems, and virtual organisations. He is an Assistant Professor at the Department of Logistics of ATEI-Thessaloniki. He is the author and co-author of over 120 research publications and as a researcher he has prepared, submitted, and managed a number of projects funded by National and European Union research bodies/authorities.

Samuel Rabi

received a BSc in Transport & Logistics Management from RMIT University in 2002 and an MSc in Operations & Supply Chain Management in 2012 from the University of Liverpool. For the past 11 years, he has worked across various elements of supply chain management and currently works as a consultant with a focus on supply chain & planning process improvement across the FMCG sector. His specialisation is S&OP process improvement, supply & demand planning enhancement and inventory optimisation.

ABSTRACT The main objectives of this article are: first, to present the evolution of collaborative demand planning approaches such as Collaborative Planning, Forecasting and Replenishment and Demand-Driven Value Networks to Demand Sensing, and second, to identify the benefits that Demand Sensing can generate for the Consumer Goods Organisations (CPG) industry. After synthesising the relative literature on the above collaborative approaches, three case studies are presented to identify the benefits of the Demand Sensing approach. The conclusions of the case studies, as well as the findings of a survey on CPG organisations in the United Kingdom and the United States, are combined in order to design a framework that organises the benefits derived from Demand Sensing into various functional areas.

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INTRODUCTION

The key issue for many organisations is the strain on operations caused by the ever-changing pattern in consumer demand. Working capital fluctuations substantially impact the cost of business, the way customer service can fulfil orders and the wider impact on inventory further downstream in the supply chain, thus underpinning overall profitability. Demand Sensing as outlined by

Chase¹ is when organisations utilise upstream data within the value chain to generate a more accurate unconstrained demand forecast for the organisation. Addressing the demand planning function through Demand Sensing aims to improve operational excellence within Consumer Packaged Goods (CPG) organisations.

Demand Sensing has become a hot topic over the past several years because of

Correspondence:
Dimitris Folinas
Department of Logistics,
Alexander Technological
Educational Institute,
Branch of Katerini,
60100 Katerini, Greece

various factors in both the consumer products and retail industries. These factors vary across the spectrum from working capital management to managing out-of-stocks (OOS), effective transport planning, improved scheduling and lastly demand forecast accuracy. Demand Sensing aims to have a positive impact on the following two critical areas for organisations:

- **On-Shelf Availability (OSA):** OSA is a critical success factor for many manufacturers and retailers as it measures how much product is available at any given time on the shelf in retail stores. According to Mitchell,² the lack of OSA has multiple factors that impact both retailers and manufacturers. Underlying causes of poor OSA such as replenishment and forecasting issues and other upstream causes contribute to poor availability. Poor forecasting can impact the outcomes of consumer choice significantly, and the results as highlighted in the chart cause additional effects for CPG organisations. Addressing these issues through Demand Sensing can highly impact OSA and bring tremendous benefit to organisations and consumers.
- **Working Capital:** Working capital is the backbone of many organisations and can have the biggest impact on cost reduction in any business. According to Davis cited by Baker,³ at any given time working capital can account for greater than 24 per cent of total logistics cost. In addition, working capital is cash tied up in the business that cannot be utilised for other investment purposes. Addressing working capital issues through Demand Sensing thus seems appropriate as it would allow for less inventory held because of adjustments in safety stock through higher forecast accuracy.

Improving forecast accuracy is thus a key lever in impacting these two focus areas, which the authors believe will have major implications for operational excellence

improvements as well as increasing sales and profitability in organisations.

This article aims to investigate Demand Sensing within the CPG industry and to ascertain the extent to which it has been adopted within the industry. The specific focus has been on CPG organisations in the United Kingdom, but will also take into account North America, where Demand Sensing has been adopted by some of the most prominent CGOs. Specifically, this study aims to answer three specific research questions in regard to Demand Sensing and its implications for the CPG industry. First, what benefit does Demand Sensing provide to CPG organisations? Second, what is the impact of implementing Demand Sensing on CPG organisations including limitations and cross comparing it with Collaborative Planning, Forecasting and Replenishment (CPFR)? And third, why is Demand Sensing succeeding where CPFR is not?

The article is organised as follows: The synthesis of the relevant literature on the main collaborative demand planning approaches is the main objective of the section 'Collaborative planning: From CPFR to Demand Sensing'. In the section 'Demand Sensing in real life examples', three case studies are presented to identify the benefits of the Demand Sensing approach in real life. The conclusions of the case studies as well as the findings of a survey on CPG organisations in the United Kingdom and the United States (the section 'Demand Sensing survey') are then combined in order to design a framework that organises the benefits derived from Demand Sensing into various functional areas (the section 'Demand Sensing benefits framework'). Finally, the conclusions and limitations of the study as well as suggestions for future research are discussed.

COLLABORATIVE PLANNING: FROM CPFR TO DEMAND SENSING

This section presents the evolution of collaborative demand planning approaches.

Three key stages can be identified:
(i) CPFR, (ii) Demand-Driven Value Chains and (iii) Demand Sensing.

Collaborative planning, forecasting and replenishment

Within the planning environment of many organisations there has been a need for collaborative efforts to improve the demand plan to drive greater efficiencies. Chopra and Meindl⁴ specifically point out that a more accurate forecast can be derived through collaboration with supply chain partners, while Holweg *et al*⁵ espouse that a strong push towards collaborative supply chains was instigated in the mid-1990s by many consultants and academics for benefits in replenishment.

The concept of CPFR according to Aviv⁶ and Barratt and Oliveira⁷ was first implemented by Warner–Lambert and Walmart in 1999. Aviv⁶ delves further into this collaboration and provides evidence that the concept of CPFR used by Walmart and Warner–Lambert was to provide convergence towards a single forecast to use between the two companies. This alludes to the notion that CPFR utilised in this manner was to improve forecasting, thus impacting other areas of the business, specifically within the supply chain. Barratt and Oliveira⁷ list various partnerships in CPFR that cover retailers within the Grocery sector as well as Pharmaceuticals, Automobiles, Apparel and Consumer Electronics. This indicates that the concept of CPFR is not exclusive to consumer goods organisations and retailers, but is more widespread across multiple industries. Holmström *et al*⁸ provide an example around Nabisco and Wegman's with their collaborative approach including the benefits generated, such as increase in sales and reducing a day's supply. It thus seems that the benefits generated by CPFR are quite considerable and if applied to various industries should lead to greater results across all industries and those organisations that apply it.

However, it seems from much of the research that there are specific trade-offs and even limitations to implementing CPFR within many organisations. Holweg *et al*⁵ outline that a collaborative approach such as CPFR was mostly developed in the grocery sector, with both success and difficulties. This enforces the notion that even with some considerable benefits, there are limitations to implementing a collaborative approach. This notion was further captured by Barratt and Oliveira,⁷ who explored collaborative planning initiatives such as CPFR with consumer organisation, and noticed that not many results have been published concerning the implementation and success of CPFR.

The assertion from Barratt and Oliveira⁷ is that collaborative planning frameworks such as CPFR are not successful because of specific barriers that exist, such as lack of trust, ineffective use of Point of Sale (POS) demand, ongoing change management, miscommunication and, especially, scalability and getting critical mass for adoption. Samuel⁹ goes further and notes that many CPFR projects fail because of lack of support from senior management, lack of rigorous collaboration and unclear objectives from the moment the CPFR project commences. Barratt and Oliveira⁷ identified a number of barriers in executing the CPFR process such as the lack of discipline to execute preliminary phases. The authors break down in detail various enablers of CPFR and define a five-stage approach as well as additional points to expand the scope of collaboration between retailers and suppliers. However, the limitation, as outlined by Barratt and Oliveira,⁷ is that there has not been enough data from pilot CPFR studies to show the benefits generated, setbacks, successful implementation and lessons learnt.

To overcome barriers within CPFR, McCarthy and Golcic¹⁰ state that organisations must first address their own internal forecasting processes before

proceeding towards CPFR. Further to this, the authors¹⁰ highlight four areas of the forecasting process that need to be addressed: management, systems, techniques and performance measurement. Thus, the success of CPFR initiatives would stem from improving internal processes before implementing collaborative approaches between a manufacturer and its suppliers. Understanding the internal processes and improving these would thus be a first step towards implementing collaborative forecasting, according to McCarthy and Golobic.¹⁰ However, the authors go further and note that CPFR alone, like any other tool, will not lead to collaborative forecasting. CPFR and collaborative forecasting for that matter rely on many other factors for success. Thus, McCarthy and Golobic¹⁰ outline that collaborative forecasting is a purposeful exchange of specific and timely information such as quantity, level and location to develop a single projected view of demand. This thus seems to indicate that specific barriers do exist for implementation of CPFR that would mirror some of those raised by Barratt and Oliveira.⁷

Three case studies of specific organisations undertaken by McCarthy and Golobic¹⁰ highlight a limited approach to collaborative forecasting that was undertaken to enable wider benefits to the businesses. In each of these cases, the authors noted that the organisations gathered intelligence by training customers and suppliers facing personnel in collaborative methods. Not only did these organisations utilise considerably less time and personnel on collaborative efforts, but McCarthy and Golobic¹⁰ note that these organisations did not make substantial investments in CPFR technology, which is often seen as a barrier to implementation, and which Samuel⁹ cites as being one part of CPFR implementation that is underestimated by many organisations and their partners. Samuel,⁹ citing Crum and Palmatier,¹¹ also highlights that within CPFR transfer of

information from upstream to downstream, partnerships need to occur effectively to ensure that the collaborative approach works seamlessly, which in most cases it does not.

McCarthy and Golobic¹⁰ also question the benefits of CPFR in that they have shown improved supply chain performance for organisations; however, barriers such as those previously mentioned need to be overcome for implementation to be successful. Their approach to collaborative forecasting in being an alternative to CPFR while still providing benefits such as increased responsiveness, increased product availability assurance and optimised inventory, and associated costs implies that the CPFR approach does not work perfectly.

Demand Sensing

The concept of CPFR, though new to the supply chain industry as a whole, was usurped in 2003 by AMR's concept of Demand-Driven Supply Networks (DDSN). According to Cecere *et al*,¹² DDSN focuses on improving the ability of organisations to respond to changes in real-time demand in customer, consumer and supplier requirements through sensing, shaping and focusing profitability on responses to demand. Martin,¹³ however, espouses the core capabilities of DDSN or in the real case of DDVC (Demand-Driven Value Chains) as being channel demand and demand management, demand translation and reliable, profitable response from supply based on demand.

Within the DDSN framework and strategies detailed by Cecere *et al*,¹² Martin¹³ and Steutermann¹⁴ was an often cited approach of Demand Sensing that would form one of the backbones of the demand management underpinning DDVC. Griswold and Sternecker¹⁵ emphasise this notion in that for demand-driven supply chains to work, not only do they require demand shaping capabilities but they also need Demand Sensing capabilities.

Ravikumar *et al*¹⁶ and Bursa¹⁷ predicted that Demand Sensing would be one of the competitive advantages that organisations will need for future competition. Bursa¹⁷ extrapolates on this and highlights that in the CPG industry, Demand Sensing can decrease shelf-level OOS, increase demand forecast accuracy and improve customer service. Truss *et al*¹⁸ build on this case in that by improving Demand Sensing, organisations can respond more effectively to changing demand signals and thus reduce the demand and supply mismatch. The authors point out that in the case of General Motors, a proper Demand Sensing tool will allow the organisation to improve the mix of vehicle configurations that it builds and distributes to its dealers.

So what is Demand Sensing? Ravikumar *et al*¹⁶ defined it as being where organisations sense the customer's purchase or choice behaviour, with Cecere,¹⁹ Chase,¹ Fay,²⁰ Tohamy *et al*²¹ and Griswold and Sternecker¹⁵ expanding on this definition to include the translation of downstream data with minimal latency utilising both customer and channel data. Thus, Demand Sensing is concerned with turning real-time demand into meaningful data to impact planning functions within the business.

The use of Demand Sensing according to Tohamy *et al*²¹ is not effective enough especially as demand changes so often. Most organisational approaches to demand forecasting according to the authors amount to utilising past figures, but do not take into account anomalies such as constrained supply, sales compensations plans that might produce a flurry of sales activity and macro influences such as weather, geopolitics and natural events.

Ravikumar *et al*¹⁶ surmise that Demand Sensing is enabled quite effectively because of customer relationship management (CRM), which is integrated into many organisations. This assertion of CRM enablement of more integrated systems from suppliers to customers, especially in the

CPG industry, is quite poignant, and the author's stance on e-businesses highlights the enablement of Demand Sensing because of the information available to the retailer and supplier. This differs for bricks and mortar companies as downstream data are captured in-store in the form of POS as highlighted by Bursa,¹⁷ Najmi *et al*²² and Tohamy *et al*.²¹ The essential part of Demand Sensing according to Ravikumar *et al*¹⁶ is the complex algorithms that help sense demand; however, their extrapolation of this focuses on adjusting price to shape demand rather than sense it.

Bursa¹⁷ builds on the notion of Demand Sensing highlighted by Ravikumar *et al*¹⁶ in that it is the POS data and even RFID that drive true Demand Sensing. The author argues that demand technology integration within the demand management process allows for better analysis of POS data, thus providing a better sense of consumer demand. What Bursa argues is that not only is Demand Sensing leveraging downstream data such as POS and RFID, but it is utilising these to drive planning to a lower level of granularity, especially in regard to replenishment. This implies that Demand Sensing is only concerned with utilising store feeds to build a more accurate demand profile for organisations. Traditional data feeds such as POS & RFID, as highlighted by Tohamy *et al*²¹ and Griswold and Sternecker,¹⁵ are not the only sources of data required for Demand Sensing, and unstructured sources such as weather patterns and social media can also provide insight and prediction for a truer demand profile.

Tohamy *et al*²¹ and Griswold and Sternecker¹⁵ highlight that Demand Sensing combined with demand shaping activities can bring multiple benefits to organisations. The implication of combining Demand Sensing with other demand management techniques is quite profound as it can impact quite dramatically the demand management activities and

ultimately the forecast generated. These benefits include an understanding of future demand patterns, which can be gleaned from shoppers and suppliers, a more accurate supply response that reflects more accurately demand and improved planning across functions to meet organisational objectives. Both Tohamy *et al*²¹ and Griswold and Sternecker¹⁵ also say that Demand Sensing combined with demand shaping provides a more proactive approach to gaining future insight of demand by changing consumer behaviour. This reflects the previous assertion by Ravikumar *et al*¹⁶ that demand sensing can be used to shape demand; however, Griswold and Sternecker¹⁵ emphasise the combination with demand shaping activities to do so.

Although demand sensing was originally thought of in the context of usage within CPG organisations even though it was loosely defined, Truss *et al*,¹⁸ Fay²⁰ and Tohamy *et al*²¹ highlight that Demand Sensing applies to other industries such as chemicals, telecoms, aerospace, automotive, ODM (original design manufacturers), distribution of organisations to OEMs (original equipment manufacturers) and EMS (electronic manufacturing services), and that it can be used in situations where there is high volatility in demand. To combat volatility, Fay²⁰ suggests three approaches, even though Tohamy *et al*²¹ suggest four, including extended S&OP (Sales & Operations Planning), resolution of visibility issues and focus on cross-enterprise processes and performance.

As stated by Fay,²⁰ Bursa¹⁷ and Ravikumar *et al*,¹⁶ the need to provide visibility within the supply chain seems to be the sweet spot to enable Demand Sensing. Enablement of Demand Sensing is a challenge in many organisations, as it requires a collaborative approach and methodologies. Truss *et al*¹⁸ point out that it is mainly CPG organisations that use collaborative forecasting methodologies,

and that collaboration along the lines of CPFR combined with Demand Sensing technologies is required for forecasting improvement. They go further by noting that a key benefit from Demand Sensing is that products will be available for customers at the right place at the right time, thus linking directly to the real benefits that this research is aiming to identify. Fay²⁰ supports this notion and goes one step further because of his approach of Demand Sensing for use with suppliers, in that the benefit of implementation is that it allows for risk mitigation across the supply chain through specific parameters.

How to gain benefits from Demand Sensing is the question that plagues many organisations, as most see it as something unique and not always applicable. Tohamy *et al*²¹ define an approach that suggests utilising pattern analysis and response assessment along with demand shaping to bring benefits. By analysing data and understanding patterns, not only can demand planners respond by changing the demand plan, but they can also help the organisation form a response assessment that will adjust other planning processes within the business.

DEMAND SENSING IN REAL-LIFE EXAMPLES

This part examines three specific case studies in relation to Unilever, Del Monte and P&G in order to determine the benefits that have arisen from their implementation of Demand Sensing.

Unilever

Being one of the largest and most recognised CGOs in the world would seem not to have an impact on how Unilever would improve its business. According to Taylor²³ and supported by Chiappinelli,²⁴ Unilever has been looking at ways to improve demand forecasting while also synchronising its manufacturing operations.

The case for Unilever as highlighted by Terra Technology²⁵ was that even though its supply bases are close to customers, it needed to deal with the challenges brought on by planning and forecasting demand. According to Taylor,²³ to adopt Demand Sensing in volatile times Unilever needed to respond quickly to fluctuations in consumer preferences and at the same time control costs. It would then be able to decrease costs, produce the right mix of products and improve customer service levels. Taylor²³ and Terra Technology²⁵ stress that the pilot programme began in 2006 and was tested across various product categories in North America before roll-out in 2009. Initial benefits as highlighted by Chiappinelli²⁴ and Terra Technology²⁵ during the trial period showed a 25 per cent decrease in forecast error. Further implementation of Demand Sensing throughout Unilever in 2009 did generate additional results for the business that have long-term impact on profitability. Taylor²³ and Ackerman²⁶ both noted that 1 year after the implementation in North America, the benefits of Demand Sensing were quite clear: 7-day demand forecast improved by 40 per cent on average and there was a 16 per cent improvement in the 28-day forecast across all brands. The impact was a reduction in finished goods safety stock by 3 days, which also led to reduced freight costs because of less stock movement and lower inventory in the system. Taylor²³ also noted that Demand Sensing allowed Unilever to focus more on tactical demand planning (5–13 weeks) and strategic planning (14+ weeks), thus providing additional benefits to the business.

Del Monte

The case of Del Monte is a point of note in the implementation of Demand Sensing and the benefits it brought to the business. Del Monte is a multibillion dollar food producer of both branded and pet food products and private label products in the

United States. According to One Network,²⁷ the initial challenge for Del Monte was to improve efficiencies in the supply chain and the related processes throughout the Del Monte network. The challenge for Del Monte according to One Network²⁷ was to increase customer service and supply chain performance while simultaneously decreasing cost.

According to One Network,²⁷ issues for Del Monte included inventory issues such as target levels and physical inventory, deployment visibility, customer services issues and lack of visibility across customer supply chain data, which affected both production and inventory availability. The demand-driven initiatives, which began in 2006 according to Brown, Dolley and Simonett,²⁸ were to improve supply chain processes such as order management, supply chain planning and inventory reduction and lower delivery costs. One Network²⁷ elaborates further in that the initial focus was on capabilities that would improve customer order fulfilment and the use of retailer data. These initiatives include implementing a Demand Sensing capability across the business to directly drive supply chain execution in real time and drive high store in-stocks for retailers. What did this mean to Del Monte?

According to both One Network²⁷ and Brown *et al.*,²⁸ multiple benefits were achieved not only for Del Monte but also for the retailers participating in the Demand Sensing framework. Brown *et al.*²⁸ note that for retailers, the benefits included improved order fill rates, reduced lead time variability, increased sales through product being in-store, lower safety stocks in RDCs (Regional Distribution Centres), improved DC (distribution centre) planning and visibility of inbound deliveries. In addition, the solution provided Del Monte with three main areas of benefits: (i) Improvement to ROIC (Return on Invested Capital): through reducing inventory and safety stock levels, reducing demand variability by using

POS data and store inventory to more accurately predict demand; (ii) Increased Sales and Profits, by improved retail in-stock positions to more than 99.5 per cent, which in turn has reduced lost sales and through meeting and exceeding customer service expectations for customers; and (iii) Lower operating expenses related to distribution: Supported through improved forecast accuracy that improved transportation mode selection and reduced expediting charges and intra-company transfers of stock. Overall, the implementation of Demand Sensing in Del Monte was a success and delivered great value. One Network²⁷ has even noted that they are still working with Del Monte to this day to continue delivering more value in the demand-driven network for the business.

P&G

Being one of the largest consumer goods manufacturers in the world with over 140 manufacturing facilities in 80 countries, Procter & Gamble, according to Castle,²⁹ required improved demand visibility and responsiveness. According to Castle,²⁹ P&G's focus on Demand Sensing is to ensure a more accurate forecast so that the right products are on the store shelves when consumers go to the store. The target for P&G was thus on-shelf availability, which impacts the sales of the business and ultimately the profitability of the company. According to Castle²⁹ and Cecere,¹⁹ P&G's benefits from implementing Demand Sensing included substantial reductions in OOS and inventory levels. Castle²⁹ outlines that the main benefit for P&G has been forecast error reduction of greater than 30 per cent, which has also enabled a 10 per cent reduction in safety stock. The impact was that P&G would increase cash flow by more than US\$100m.

DEMAND SENSING SURVEY

This part presents and analyses the results gathered from the Demand Sensing survey

in regard to Demand Sensing and its adoption and benefits within the CPG industry. The purpose of the survey was to gather data around Demand Sensing and CPFR within the CPG industry and to validate the research question concerning the benefits of Demand Sensing to CPG organisations. The survey was initially sent out to a group of 10 people for pretesting and refinement. These 10 people represented 25 per cent of the identified participants of an original population of 40 people to participate in the survey. Of these 10, 6 provided feedback, which was used to finalise the survey before being sent out by email to all 40 participants in July and August 2011. In addition, the survey was sent out through various links to an online questionnaire on LinkedIn within the various supply chain groups to solicit additional responses.

Respondent profiles

According to the findings, 44.2 per cent of respondents belong to CPG organisations. In addition, out of the CPG respondents measured, it was observed that 45 per cent of these respondents had previous sales of £1.0 billion or more the previous year (2011). Fifty-five per cent of them are located in the United Kingdom, 15 per cent in the United States and a further 10 per cent in Western European countries; all other respondents made up 30 per cent of the results required. Moreover, 60 per cent of them see Demand Sensing as being incorporated as part of the CPFR. The implications of this for this study are not remarkable as the focus is on the benefits of implementing Demand Sensing within CPG organisations; however, it brings additional insight that Demand Sensing should be included as part of an implementation of CPFR within CPG organisations.

Perceived benefits

Each of the respondent profiles was evaluated in regard to the responses given

Figure 1: Perceived benefits.

across the remaining questions in the survey. On the basis of the initial evaluations, respondents answered subsequent questions in relation to the types of benefits they perceived as being achieved from implementing CPFR or Demand Sensing.

Figure 1 details the perceived benefits for both Demand Sensing and CPFR that were evaluated by the respondents. The respondents ranked from 1 to 5, with 1 being very low and 5 being very high, 14 criteria detailing the perceived benefit of implementing CPFR or Demand Sensing. What was interesting from the outcome of this ranking was that most respondents on average gave higher rankings of benefits that would be achieved by implementing Demand Sensing and not from CPFR. It was observed that in three areas all respondents on average ranked the benefits higher from implementing CPFR:

- (i) Improved supplier collaboration,
- (ii) Improved customer collaboration and
- (iii) Improvement in promotional planning.

The inherent implication of this analysis is that most CPG organisations view CPFR as being able to provide the collaboration backbone between suppliers and customers, whereas Demand Sensing does not facilitate collaboration, but rather is the tool that provides the analysis to improve specific areas within the supply chain. The notion of promotional planning being a medium benefit of implementing Demand Sensing implies that CPFR plays an important role in ensuring strong collaboration to enable effective promotional planning in CPG organisations. The results tie in with the previous question concerning where most respondents indicated Demand Sensing is incorporated as part of CPFR.

Figure 2: Barriers to implementing Demand Sensing.

The information illustrated in Figure 2 highlights answers to the question as to what barriers CPG organisations see as being barriers to implementing Demand Sensing. Participants were asked to rate each of the barriers listed from a rating of 1 to 5 with 1 being very low and 5 being very high as impacting Demand Sensing within their organisations. The figure indicates that cost of implementation and system integration are potentially strong barriers for many organisations within the CPG industry to implement Demand Sensing. In addition, perception is that data integrity, communication channels and the lack of analytical tools to act on Demand Sensing results would also play a major part in preventing implementation within CPG organisations.

In line with this analysis, additional questions aimed to ascertain whether the barriers listed above impacted the implementation of Demand Sensing. Respondents were asked whether they have been asked by customers or suppliers to implement CPFR and/or Demand

Figure 3: CPFR or Demand Sensing requested for implementation.

Sensing and whether they have already implemented any of these solutions within their organisations with customers/suppliers. Figures 3 and 4 highlight that not only have customers and suppliers asked the CPG companies to extend Demand Sensing solutions from these businesses, but

Figure 4: Current implementation and extension of CPFR and Demand Sensing.

also that a majority of CPG organisations are currently utilising CPFR and only 30 per cent are looking at extending Demand Sensing to their customers.

The outcome of this analysis thus indicates that Demand Sensing is not seen as a solution, even though from previous analysis there appears to be great benefit from implementing the solution. On further investigation, the authors delved into the results and noted that only one CPG organisation from the target group provided data around the implementation and benefits of Demand Sensing. The authors thus expanded the sample size to understand the real benefits obtained by organisations.

In regard to the implementation of Demand Sensing solutions as highlighted in Figure 5, 66.7 per cent of respondents could not outline the cost of implementing the solution. However, out of those that did, 16.7 per cent mentioned that it cost between £2.0 and £2.9m for implementation, whereas another 16.7 per cent highlighted that implementation cost <£200k. No correlation could be determined for the length of the implementation of Demand Sensing solutions dependent on the cost of implementation. However, Figure 6 indicates that 66.7 per cent of respondents

Figure 5: Cost of implementation.

Figure 6: Length of implementation.

mentioned that the Demand Sensing implementations were still ongoing as of the time of undertaking the survey. As this was not clarified, an assumption has been made based on the 33.3 per cent of respondents who did indicate that implementation took between 9 and 12 months.

Figure 7 highlights that 40 per cent of those respondents who have implemented

Demand Sensing or are in process of implementing Demand Sensing solutions have seen benefits to their organisations within 3–6 months. The split of all other respondents was equal at 20 per cent each across benefits obtained in less than 1 month, 1–3 months and 9–12 months. As mentioned previously, because of the lack of solid data, no correlation has been made as to the benefits ascertained based on the cost of the solution used or the length of time it had taken to implement the Demand Sensing solution in each of the organisations.

All respondents were provided with a list of benefits that would be obtained from implementing Demand Sensing solutions and were asked to rank how great the benefits

have been for their organisations from implementing the Demand Sensing solution. The ranking for each benefit was from 1 to 5, with 1 being the lowest benefit obtained and 5 being the greatest benefit obtained.

Figure 8 highlights the average results obtained from the respondents who have and are still implementing Demand Sensing, and it was noted that the biggest gains for implementing Demand Sensing within CPG organisations are:

- Improved customer service levels.
- Improvement to new product introduction forecasting.
- Improved S&OP.
- Improved inventory position.
- Improved customer collaboration.
- Improved OSA.

Figure 7: Length to benefits being obtained.

According to the results, both inventory (working capital) and OSA were listed as being the main cause for implementing Demand Sensing, as improvement to forecasting would improve these areas. Thus, the benefits obtained from some of the respondents seem to validate the reasoning behind undertaking Demand Sensing implementation.

Figure 8: Demand Sensing benefits achieved.

DEMAND SENSING BENEFITS FRAMEWORK

Demand Sensing focuses on using visibility and collaboration tools to create a direct view on the real demand from customers as it happens, and using this as intelligence to feed back up through the supply chain. Understanding what is actually happening with real demand, unpolluted by, for example, retailer stocking policies, network balancing and the retailer's own forecasting tools, is invaluable in being able to respond to the challenges inherent in matching supply to the variances that occur on a day-to-day basis. Rather than wait for week or month end to run statistics and try to establish why there are variances (and why they occurred), monitoring of new demand (whether in the form of signals from the retailer, or more directly the ePOS data sourced from their systems) provides more immediate and more accurate information.

Planning analysts have the ability to establish whether the plan needs changing or whether the assumptions underlying the plan need to be reevaluated. This level of sensing, control and coordination through every tier of the plan (at a detailed level) prevents the build-up of unnecessary inventory and enhances responsiveness to customers. Demand Sensing should not replace the traditional demand forecasting process but rather should complement it. By understanding and applying Demand Sensing in conjunction with traditional demand planning horizons, organisations are able to enhance their traditional planning processes, increase visibility and provide an accurate picture of demand.

Within the scope of implementing any solution to improve organisational efficiency, most organisations need to identify the key benefits that would arise and whether these would justify the return on investment for the identified solution. Thus, benefits within Demand Sensing are quite crucial to any business case for

implementation, as without these the justification for Demand Sensing implementation does not exist.

Within the research undertaken as specified in the section 'Demand Sensing in real life examples', various benefits were identified within organisations that implemented Demand Sensing solutions. The case studies of Del Monte, Unilever and P&G highlighted various benefits that were achieved from implementing Demand Sensing. Within the further research undertaken by the authors, the survey used to collect information on Demand Sensing asked the respondents to rank the actual impact of the benefits of their organisation. These benefits included those outlined in the literature review, the case studies and also those that the authors have proposed to client organisations.

Therefore, the question for many organisations is: *Which are the real benefits from implementing Demand Sensing?* Figure 9 can be considered as a framework that presents the benefits derived from Demand Sensing. This framework organised the benefits based on the main functional areas of a CGO. These benefits ultimately lead to driving responsiveness within the value chain.

The above benefits/areas are analysed below.

Demand Planning: Owing to the Demand Sensing implementation occurring within the demand planning function, the largest benefits impact the demand planning team because of the responsibility in creating the demand plan. The main benefits that can be observed with implementing a Demand Sensing solution include:

- Less short-term forecast volatility (1–8 weeks) because of the truer picture of demand.
- Less long-term forecast volatility (8+ weeks), as demand planners tend to focus on more value-adding activities to enhance longer-term demand plans.

Figure 9: Demand Sensing benefits.

- Reduced forecast bias because of greater input from retailer data and unconstructed data (weather patterns, social media, Nielsen data and so on).
- Improvement to demand forecast mix, thus increasing overall forecast accuracy.
- Improvement of promotional planning by utilising live POS data to feed into current promotional demand plans.
- Improvement of new product introduction forecasting.
- Improved supply chain visibility and customer collaboration due as data are shared across multiple enterprise networks, that is, CPG manufacturers and retailers.

Supply Chain Planning: The knock-on effect from demand planning to the supply chain planning team in general is quite significant because of the integration of these teams. Benefits start moving beyond the scope of demand planning and have a wider impact on the organisation.

- Capacity synchronisation and scheduling through improved and more accurate demand plan.

- Effective inventory planning because of improvement of capacity and scheduling improvements, leading to lower working capital and reduction in safety stock required for products at the DC level.
- Lower level of OOS as there is a reduction in capacity mismatch with demand.
- Higher customer service levels through more product availability in the logistics and distribution network.

Logistics and Distribution: Replenishment teams in general take the brunt of fallout when things go wrong in the supply chain. Within Demand Sensing, the replenishment aspect is dramatically improved because of the increased visibility of data both upstream and downstream within the value chain. Thus, within the logistics and distribution arena what can be observed is:

- Improved deployment planning because of more visibility of working capital within the distribution network has an impact on reducing OOS and excess inventory as the deployment team can better plan where

product is required to meet customer requirements.

- Improvements in order fill rates because of the availability of stock.
- Transport and deployment scheduling efficiency is increased because of improved visibility of customer requirements.
- Network planning improvements as the Demand Sensing data allow for effective planning of distribution requirements because of the upstream data flowing through to create a more detailed network requirements plan.

Sales and Marketing: Although large parts of Demand Sensing improve the supply chain functions of demand and supply planning and logistics and fulfilment, there are additional benefits that can be derived by the sales and marketing functions within CPG organisations.

- Improved OSA because of link of supply chain data with demand planning.
- Increase in revenue because of higher level of services provided by the organisation to customers and ultimately consumers.
- Reduction in product obsolescence because of improved demand plans that minimise obsolescence obtained on product phasing, that is, iPhone 3 to iPhone 4 and through improved planning on short shelf life products.
- Improved customer satisfaction because of the availability of products on-shelf.
- Improvement of new product introduction through better customer insight at POS.
- Synching sales and marketing plan with demand plan to drive one forecasted number.
- Merchandising optimisation as customer insight is used more effectively.
- Field sales optimisation as reduced latency of sales data impacts how the field sales operation approaches customers.

Manufacturing and Suppliers: Within the manufacturing and supplier environment,

the knock-on effect from Demand Sensing is not always clear-cut because of its application more to upstream data than to downstream data. OneNetwork²⁷ highlighted with its solution that Demand Sensing can be applied further downstream as it did with Del Monte and thus benefits can be identified at the manufacturing and supplier side of organisations:

- Reduced inventory at raw materials/ packaging suppliers because of the knock-on effect from improved working capital position at CPG organisations.
- Lead time improvement because of the improved use of real-time forecast to drive enhanced scheduling and procurement.
- Lower cost and prices because of more stable purchase plans that allow for better term negotiations with suppliers and contract manufacturers.
- More reliable levels of supply as there is a more stable demand pattern that feeds through the BOM (Bill Of Materials) that gets passed back to suppliers who can plan more effectively.

Finance: The implications of implementing Demand Sensing within CPG organisations are quite substantial on the financial side. As CPG organisations improve the demand plan, further operational efficiencies become evident that drive benefits to the finance function and overall organisation profitability.

- Alignment of financial forecast to the demand plan, which leads to a forecasted number to drive financial decision making.
- Synchronisation of financial projections within the organisation with operational requirements and the organisational goals.
- Lower operational costs and increase in operating margin through reduction in working capital through efficient planning

and lower supply chain operational costs as a whole.

- Investment focus as capital can be reallocated more effectively to where it is required to enhance the organisation's performance.

CONCLUSIONS

Demand planning will always remain a critical area of focus for consumer goods suppliers and retailers, for the simple reason that they cannot sell products that are not on the shelf. The demand planning and replenishment area addresses the last mile in the retail value chain. Taking a demand-driven approach ensures that supply and demand align as closely as possible, compensating for forecasts that are often incorrect without incurring excess costs. Building on this, implementing a Demand Sensing solution is a key backbone to becoming demand-driven, and the benefits in doing so are quite significant to many CPG organisations, as it will give them competitive advantage. The benefits do not just exist within the supply chain functions, but extend to other functions in the organisation and thus cross the entire value.

However, CPG organisations need to assess the benefits that would be applicable to them and then ensure that measurement can be obtained before proceeding forward with implementation. Moreover, CPG organisations need to ensure that they follow a structured approach to obtain the benefits, otherwise any Demand Sensing solution will be lost on the organisation. Implementation itself needs to be undertaken with care, as many organisations, especially in the CPG arena, tend to implement solutions before being ready for them. Ensuring that the demand planning function is at a mature stage not only allows organisations to implement the solution effectively, but also enables larger benefits to be achieved more quickly.

Even though this research contributes in regard to the benefits of Demand Sensing for CPG organisations, there were some

limitations. In assessing the literature it seems that there is very little independent thought towards Demand Sensing and its implications for various industries. What literature does exist provided some background on Demand Sensing, but not to the degree that full conclusions could be derived from it. Moreover, the case study assessment was quite limited in terms of organisations and data because of the lack of publicly accessible information. In addition, the authors doubt some of the benefits achieved by the organisations due to the sensitiveness of the data. Finally, the responses to the surveys did not reflect well the scope of organisations that the author wanted to cover within this piece of research. Furthermore, the sensitiveness of the data required seemed to preclude that response would be limited in the survey.

Additional areas have been identified as opportunities to gather more insight for Demand Sensing. Specific responses within the survey ascertained various aspects in costs, length of implementation and time to receive benefits from implementing Demand Sensing. Understanding the correlation between these factors and quantifying them accordingly would build on this research and provide greater insight into the appropriateness of implementing Demand Sensing. The low volume of data provided by the CPG sector within the survey identifies an opportunity to reassess the applicability of Demand Sensing within the industry and to potentially build further on this assessment by expanding the scope to additional industries. Moreover, an opportunity exists for additional research into quantifiable data around benefits within the CPG industry where Demand Sensing has been implemented, as these were limited given the data obtained for the case studies. Finally, additional research should be undertaken to understand the correlation between OSA and Demand Sensing and what improvement in OSA Demand Sensing brings.

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