E-Supply Network Management—Unused Potential?

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If I'd asked people what they wanted, they would have asked for a faster horse.

—Henry Ford.

Abstract SMART supply network is based on Sustainable, Modern, Adaptive, Robust and Technology-oriented approach to the flows management. Information, product and money flows are those of the special interest of all the efforts undertaken by supply chain managers. However in most of the cases they focus on the implementation of the processes from the perspective on the enterprise. Even the holistic approach to the processes development in the network ends when the product becomes the property of the customer. Supply networks can be built in more valuable manner. It can be caused by technology that enables and allows for tracking and analyzing the way of the actual use of the product by the consumer after the good is bought. The aim of this chapter is to present the concept and the potential of the benefits resulting from possessing the information concerning after-sales usage of the product by the customer. To gain on this information the customer Internet of Things (IoT) data should be introduced into the supply network management. The scientific contribution of the article is based on the thesis that the processes of supply chains or networks do not end at the moment of the sale of the product, but in reality they may have their origin in the information on how the product is actually used after it is sold to the customer. It could be done by SMART e-supply network management based on customers IoT data exploring. The study is based on literature review methodology. The EBSCO and Emerald data bases were used for the research purposes.

Keywords E-supply network · Internet of things · After-sales usage of the product

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A. Kawa and A. Maryniak (eds.), *SMART Supply Network*, EcoProduction,
https://doi.org/10.1007/978-3-319-91668-2_1

1 Introduction to Supply Network Management

Christopher [4] defined supply chain as "the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer". The same author also concludes that whilst the phrase "supply chain management" is now widely used, it could be argued that "demand chain management" would be more appropriate. This is to underline that in fact the chain should be driven by the market (customer and the demand), not by suppliers. At the same time word "chain" should be replaced by "network" as there are multiple suppliers, as well as multiple customers in the whole system [5].

However what is the most important when analyzing competitiveness of the supply chains is the integration that allows taking and implementing strategic decisions in the whole system. Integration becomes a vital factor for effective functioning of supply chains to meet the performance objectives like cost, responsiveness, serviceability and agility. Stevens and Johnson [18, p. 22] described supply chain integration as "the alignment, linkage and coordination of people, processes, information, knowledge, and strategies across the supply chain between all points of contact and influence to facilitate the efficient and effective flows of material, money, information, and knowledge in response to customer needs". According to the Supply Chain Operations Reference (SCOR) framework, the integration of demand and supply management across a supply chain takes place through four broad processes like plan, source, make and delivery, which involves flow of material, information and fund. In the context of SCOR model, Hoole [8] put forward the competitive priorities of a supply chain. An effective supply chain management intends to provide consistent quality in response to the market needs with agility while eliminating waste out of the system to reduce cost and generate supply chain surplus. However, it requires access to information on time and an efficient data management for governing the activities and performances and hence having business insight to explore opportunities and overcome difficulties [8].

To enable smooth processes development and continuous of flows, it seems to be evident that Information Technology (IT) has become instrumental and impact on the formulation of competitive advantage of the supply chain or supply network. Ryssel et al. [14] described IT as a technology which enables to communicate, interpret, exchange and use information in the forms of data, voice, images and videos there must be collaboration among both the virtual value chain and the physical value chain for providing required value to the end customers [15]. However Liker and Choi [11, p. 112] commented that "…sharing a lot of information with everyone ensures that no one will have the right information when it's needed". This means that supply chain requires the availability of timely, accurate, precise and relevant information for effective decision making. Therefore the integration aspect and the leader should be engaged.

Information that is important for supply network management is very broad. It includes customer information, sales information, market and competitor information, product and service level requirement, promotion/brand information, demand forecasting, inventory, capacity utilization, process planning and control information, skill inventory, human information, sourcing/vendor information, networking information, logistics, warehouse planning, pricing and fund flow/working capital information, etc. Therefore, the role of data and its management can never be over emphasized in the context of supply network management. Its flows in this system are shown on Fig. 1 [3]. It depicts a typical data driven supply chain structure. Here, demand is initiated by customer end which flows through subsequent stages to the supplier end. Supply of goods and services follows the path from the supplier end to the customer end. Return of goods for repairing, remanufacturing and recycling follows the reverse path to demand [3].

Whole the system is powered by the different types of data and information and would not be feasible to conduct without IT support. Therefore concepts such as e-supply chain, Internet of Things (IoT), smart factory, and industrial internet, have been introduced to represent larger and more complex business systems: from isolated Radio-Frequency Identification (RFID) application to local IoT implementation, to smart factory, and then to part of the global supply chain network within the same company [22]. However, this is a customer who should 'decide' how to build an adequate supply chain or network business model.

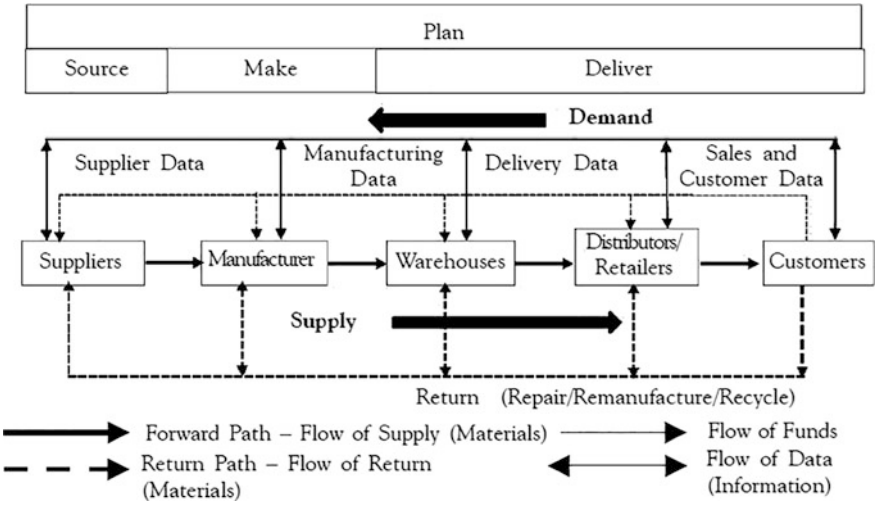


Fig. 1 Data-driven general supply chain structure. *Source* Biswas and Sen [3]

2 Customer Experience and Personalization—the Driving Forces for the Supply Network

Currently instead of designing supply chains from the "factory outwards" the challenge is to design them from the "customer backwards". This means (and is presented on Fig. 1) that the customer is not at the end of the supply chain but at its start [5, p. 39]. As it was already mentioned it is more properly to say demand chain management or demand network management. According to Baker "managing demand chains is fundamentally different to managing supply chains. It requires turning the supply chain on its head, and taking the end user of the organization's point of departure and its final destination." [2]. Therefore an appropriate sequence of actions to create market-driven supply chain might begin with an understanding of the value that customers seek in the market in which the company competes. This sequence is shown on Fig. 2 [5, p. 40].

Customer can be defined in multiple ways, i.e. as end user; the one who is affecting the buying decision; the one who is interacting with the product; the one who is buying, etc. The recognition and differentiation of the customer type, the consumer and the user enables companies in proposing adequate value and matching resources during the cooperation. Those aspects should be revised prior to the decision on how to build the best supply chain (network) business model that meets the needs of right customer or user.

Nowadays, supply chains' managers use different methods for quickly responding to the fluctuations in the demand and customers' needs and expectations. There might be the following concepts introduced into the management of to help gaining on competitive supply chains:

- demand-driven supply chains,
- lean management,
- *leagile* (lean and agile) supply chains,
- involving customers in product design and development, crowdsourcing,

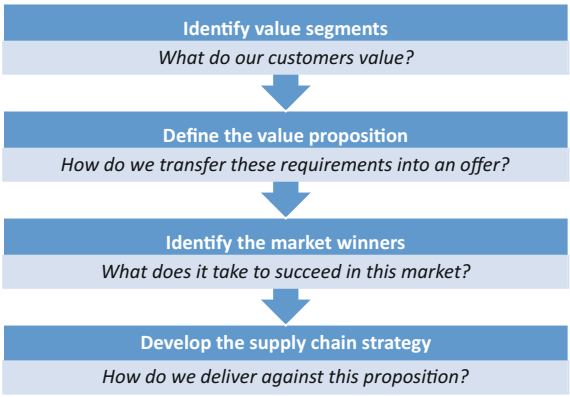


Fig. 2 Linking customer value to supply chain strategy. *Source* Christopher [5]

- analyzing customers journeys and customers experience during the cooperation with the company (mostly supplier),
- customers segmentation,
- introduction customers relation management systems,
- analyzing customers' satisfaction level,
- market researches, etc.

All those activities and solutions are very important. However they might be not sufficient for maximize profits. For example "after mapping five customer segments, one industrial Original Equipment Manufacturer (OEM) found that nearly 70% of its marketing dollars and sales efforts across them were not directed at what mattered most to customers. The company had invested heavily in customized demonstrations to roll out next-generation equipment. The demos were available to all customers, but only those in two of the segments—product enthusiasts and R&D innovators—really cared about participating in them. The rest, comprising over half of the customer base, were happy to visit a plant only occasionally, receive information remotely, or wait their turn for a technical specialist to visit with a standard demo kit" [12]. This actually might mean lack of proper tool for customers' needs identification, their segmentation and marketing.

One of the solution helping companies to impact on their supply chain competitiveness is to reimagine and digitize entire "customer journeys". These are the beginning-to-end processes that customers experience in getting the product (goods or/and services) they need, across whichever channels they choose during the cooperation with the company [6].

Customer experience can be defined as customers' perceptions—both conscious and subconscious—of their relationship with brand resulting from all their interactions with brand during the customer life cycle (www.sas.com/en_us/insights/marketing/customer-experience-management.html). Gartner defined customer experience management as: "the practice of designing and reacting to customer interactions to meet or exceed customer expectations and, thus, increase customer satisfaction, loyalty and advocacy." (www.gartner.com/it-glossary/customer-experience-management-cem/).

To reach this goal companies are creating special programs for supporting customers with the best experience during the 'journey' with the company until the product is sold. To achieve this aim, they are trying to recognize all the needs, wants and expectations of the customers by asking them for that or inviting to design the product at the early stage of its development. The next step is creating personalized experience by integrating advanced digital technologies and proprietary data for customers. Brand individualization unlocks the ability to enhance loyalty with customers by tailoring the experience to each contextual user journey. According to BCG study two-third of respondents representing 50 companies from 10 industries said that they expect at least a 6% incremental annual revenue lift from personalization. Half of the surveyed respondents had more than 25 employees dedicated to personalization programs and were spending more than $5 million a year on personalization campaigns [1]. At the same time companies

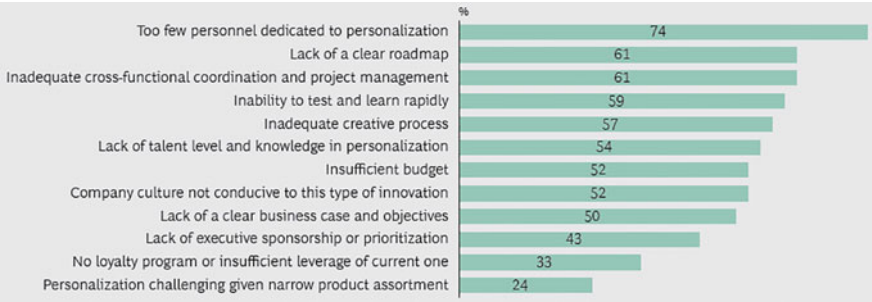


Fig. 3 The top organizational barriers to personalization. *Source* Abraham et al. [1]

indicated a lack of dedicated personnel as the biggest organizational barrier to personalization. Majority of them also faced problems with lack of clear roadmap for personalization and inadequate cross-functional coordination and project management. The main barriers for implementation of personalization in the companies are shown on Fig. 3 [1, p. 4].

To gain on personalization it is important to adopt this concept on the strategic level of the management. It is due to the fact that personalization should not only be a domain of marketing activities, but impacts on the whole business model. It is because it might offer portfolio of different customers' journeys and therefore requires flexible elements of such a business model. The next step is to build data and analytics capabilities in the company or rather in the whole supply chain. To profit on technology the whole system should be transformed to digital solutions based on cloud platform. The last part of the personalization is to enable new ways of working. According to BCG survey, leading companies share common ways of working. For example they collapse silos, create dedicated cross-functional personalization teams, locate their member together and work fast [1].

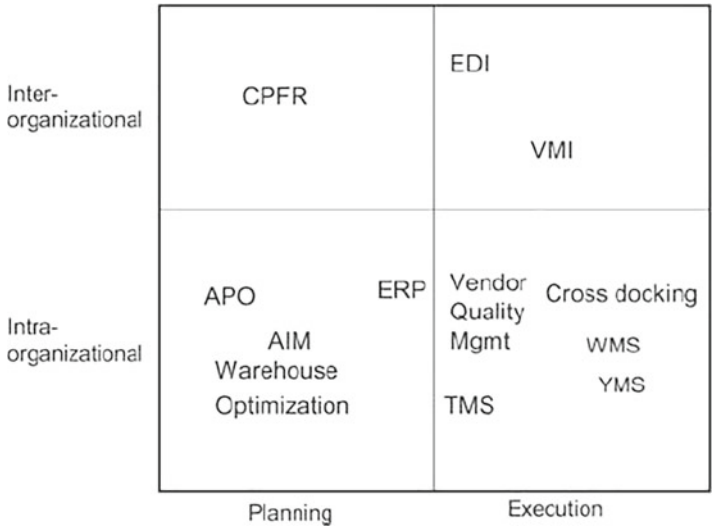
3 Technology as the Main Driver for Smart Supply Network

Supply chain management may have limited resources to fully recognize advantages that could be obtained by streamlining and improving the entire process of meeting customer needs. Therefore there is a need to move beyond managing supply through a chain of suppliers, manufacturers, distributors, and retailers. The focus on managing fulfillment in a linear way has led to the development of information systems supply chain applications that have primarily supported sequential information flow (e.g. EDI—Electronic Data Interchange; VMI—Vendor-Managed Inventory), and have managed demand information in Customer Relationship Management (CRM) applications separate from supply chain applications. Moreover, the implementation of these applications has often occurred

without process change, assuming that the software will directly support existing physical processes and flows [16].

Currently there is a need to focus on improving value for customers in supply or demand networks that should respond to personalized and changing needs. The technology is evolving to accomplish this task. However, its implementation might be stall if trust mechanisms and metrics are not developed to support this new focus on value network advocacy [16]. Anyway, in order to compete by supply network numerous IT systems have been developed. Their goal is to support planning and execution activities. They are implemented within the organization and together with external partners. Those solutions supporting different aspects of planning or executing activities related to fulfillment are shown on Fig. 4 [16]. Inter-organizational coordination was previously accomplished by some early adopters with the use of EDI systems. These systems were examples of "standardization", which involves the establishment of routines or rules that constrain actions of each unit into paths consistent with others in the relationship [19]. EDI standards had to be agreed upon, adopted, and adhered to in order to coordinate the actions of the individual parties.

Today companies have an access to tremendous and powerful volume of data by using digital technologies in their business models. It is structured, unstructured and uncertain. However the most important aspect is the ability to take the advantage from this data. Therefore Big Data Analytics is needed. It should be supported by



CPFR - Collaborative Planning, Forecasting and Replenishment; EDI - Electronic Data Interchange; VMI - Vendor-Managed Inventory; APO - Advanced Planner & Optimizer; ERP - Enterprise Resource Planning; AIM - Applied & Integrated Manufacturing; WMS – Warehouse Management Systems; TMS – Transport Management Systems, YMS – Yard Management Systems.

Fig. 4 IT investments in the supply chain. *Source* Sherer [16]

the algorithm that enables whole supply network compete with the information impacting on the strategic decisions.

One of the most important sources for data supporting supply chain management is IoT. According to Gartner, IoT is "the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment." (www.gartner.com/it-glossary/internet-of-things). Gartner also underlines the IoT Analytics as one of top 10 IoT technologies for 2017 and 2018 saying that IoT business models will exploit the information collected by "things" in many ways. For example, "to understand customer behavior, to deliver services, to improve products, and to identify and intercept business moments. Thus, IoT demands new analytic approaches. New analytic tools and algorithms are needed now, but as data volumes increase through 2021, the needs of the IoT may diverge further from traditional analytics" [21]. At the same time M. Tu recognized four key factors that affect firms' intention to adopt IoT when managing their logistics and supply chain: perceived benefits, perceived cost, trust of technology, and external pressure. According to this study trust of technology indirectly affects the adoption intention through perceived benefits. The research finding indicates that many firms do not feel urgent to adopt IoT when there is no external pressure, such as regulations or strong requirements from customers [20]. Also, for all of the opportunities that IoT offers, there are some significant risks that companies within supply network need to address before they adopt IoT in full measure. There are aspects like regulatory, cybersecurity, privacy, legal, standards, scalability, etc. [7].

Additionally there are several areas that should be fulfilled to gain on data availability through supply networks. First of all those supply networks should have similar features like the ones that characterize smart supply chains. Smart supply chain can be understood as "the new interconnected business system which extends from isolated, local, and single-company applications to supply chain wide systematic smart implementations" [22]. The smart supply chain possess a number of the characteristics, including technologies such as IoT, smart machines, and intelligent infrastructure, and capabilities such as interconnectivity, fully enabling data collection and real-time communication across all supply chain stages, intelligent decision making, and efficient and responsive processes to better serve customers. Smart supply chains collectively possess six distinctive features. They are [22]:

- instrumented: information in is overwhelmingly being machine-generated, i.e. by sensors, RFID tags, meters,
- interconnected: the entire supply chain, including business entities, and assets, IT systems, products, and other smart objects are all connected (i.e. by cloud computing platform),
- intelligent: they are able to make large-scale optimal decisions to optimize performance,
- automated: they must automate much of its process flows by using machines to replace other low-efficiency resources including labor,

- integrated: supply chain process integration involves collaboration across supply chain stages, joint decision making, common systems, and information sharing,
- innovative: innovation is the development of new values through solutions that meet new requirements, inarticulate needs, or even existing needs in better ways.

In a similar way IDC has defined the "thinking supply chain" in the context of five "Cs". Each of these areas contributes critically to the planning of the supply chain as a whole, integrated system [9]:

- connected: being able to access unstructured data from social media, structured data from the IoT, and more traditional data sets available via traditional ERP and B2B integration tools,
- collaborative: IDC has estimated that over 50% of the value creation in manufactured products comes from outside the traditional manufacturing enterprise. Improving collaboration with suppliers is critical, and in the digitally enabled supply chain, this increasingly means the use of cloud-based commerce networks to enable multi-enterprise collaboration and engagement,
- cyber-aware,
- cognitively enabled: the artificial intelligence (AI) platform becomes the modern supply chain's control tower by collating, coordinating, and conducting decisions and next best actions across the chain in an automated and timely way. Certain exceptions would require human intervention, but most of the supply chain would be automated and self-learning,
- comprehensive: analytics capabilities must be scaled with data and in real time. Latency is unnecessary and unacceptable in the supply chain of the future.

The concepts of smart supply chain or thinking supply chain are compatible with the idea of SMART Supply Networks. This is due to the fact that SMART Supply Networks can be characterized as: Sustainable, Modern, Adaptive, Robust and Technology-oriented. This means that they are sustainable supply networks (the ones in which balance with regard to social, economic and pro-environmental issues is maintained) which are modern (i.e. the networks implementing the latest solutions in the management and operational spheres), adaptive (i.e. agile and flexible networks), robust (networks in which the degree of sensitivity for unforeseeable changes is relatively low) and which absorb the latest technological solutions.

All of the described approaches to modern and competitive supply chain (network) have two, basic points of references to gain on value. First—they are strongly supported by digital technology (therefore they might be called "e-supply network") and second—they are customer centric.

4 The Potential of Customer IoT Data for E-Supply Network Management

Today competitive supply networks are the ones that are intimately connected to data sources such as the IoT enabled with comprehensive and fast analytics, openly collaborative through cloud-based commerce networks, conscious of cyber threats, and cognitively interwoven [9]. Supply networks are expected to be data driven and demand aware, they should have access and ability to analyze disparate data sources in the time frames required and profound implication for B2B processes and their underpinning technology. They are e-supply networks. While technology must ultimately serve the interest of supply networks it is extremely important to understand that these technologies will enable new capabilities or new business models across all industries and all regions. However still the most important aspect is to diagnose and differentiate knowledge about needs, wants and expectations of the customer (or rather consumer). Current level of technological maturity is also enabler for recognizing of the actual way of using the product after it is bought by the customer. The information concerning real usage of the product—frequency of usage by the buyer and by other users, type of activity per user and per frequency, connection with other products during its usage, etc. are great undiscovered data, thanks to which the new solutions and product innovations can be built within competitive supply network.

Smart algorithms and machine learning can be used to deliver advanced analytics for new product development. This all can be based on the information that is send by the product and/or shared by the user. In this way users creativity shown on real use-case basis can be the starting point for modeling new solutions and crating additional value proposition. It can be also a new starting point for supply network processes fulfilment of even new business models implementation.

Currently companies collect and use the information from the customer i.e. by tracking and tracing their behavior on web pages or how they share data on social media. Also IoT is a good source of data and information acquisition for portfolio personalization.

The perception of the role of personalization and ability to reorganize actual business model are very important first steps in the way to gain on e-supply network management. However they still might be insufficient to maximize profits from having the relations with the customer or the product user.

It would be also very valuable for the companies and their supply networks to expand the range of common experiences. In most of the cases those customers' experiences journeys end in the moment when the product is sold and for the loyalty reasons some additional incentives are proposed to attract customer for the next shopping. Consumers have increasingly high expectations of the level of customer support and after-sales service. Therefore companies developing services that impact on the quality of brand recognition and experience supporting customers with transportation, possibilities of long-term returns with no costs or repair

services, etc. All those activities are very valuable and might be a reasons for customer's choice of the product.

However there are still not too many companies that are collecting and developing knowledge on user experience after the product is bought by the customer. Due to the technology features, today companies have unprecedented opportunities to obtain information about the real usage of products by anybody who has any experience with it. So they are not declarations but real-life cases showing what are the real reasons for buying the product (good). Probably the less complex the product is, the more applications of usage it may have. Analyzing this kind of information can be made by technology implementation and data analyzing. As known, currently the IT companies are tracking usage of web pages or keyboards or what is a customer's path ways in the real (physical) shop. These kind of data is recorded, processed and used for delivering more convenient product or exposing brands in more visible way to the customer.

However, within the product there can be sensors installed that are able to connect with the company and send information concerning services that can or should be supported by the company to the customer. Additionally using IoT supported by sensors, bar codes, Quick Response Code (QR) codes, Global Positioning System (GPS), RFID offer the potential for recognizing new opportunities for value proposition development in SMART supply network. All these data can be collected and processed by cloud computing usage for building innovative supply networks [13].

Cloud computing adaptation is dedicated for processing the huge amount of data (Big Data) collected by various physical assets and for providing flexible access interfaces. Service-oriented methods are applied to facilitate the sharing of assets and services and to enable the development of flexible and scalable Decision Support Systems (DSSs) [27]. According to Yu et al. [28] the IT technology plays an essential role in improving the efficiency and effectiveness of supply chain management. Future technologies like IoT, Big Data Analytics, and Cloud Computing would be possibly adopted to enhance the E-commerce logistics in terms of system level, operational level, and decision-making level that may be real time and intelligent in the next decade.

Additionally there is the concept of smart asset introduced for remote real-time data collection, and the corresponding software agent model is developed to wrap these diverse assets, realizing the Universal Plug and Play (UPnP) working mode [27]. Figure 5 presents architecture of IoT-based tracking and tracing platform, where typical information flow is shown together with different layers engaged in the system [10]. The proposed solution is based on food supply chain and consists of four main layers. The perception layer refers to the physical assets and corresponding smart devices. All physical assets are attached with smart devices to become smart. Smart gateway connects and manages a set of physical assets nearby, processes caches and exchanges real-time data and events locally and temporally, and provides support for service definition, configuration, and execution. The data layer stores the data collected from the perception layer and the execution data generated from the upper layers. Than the service layer is introduced

to provide extensive management services in supply chain and excluding the complexity of managing the underlying hardware and software. The last is the application layer that contains applications built upon the services provided by the service layer. Three applications are designed to cover the three key stages of prepackaged food supply chain, from production, logistics, to consumption [10].

The example of the food supply chain architecture of IoT-based tracking and tracing platform based on cloud computing is a good point of reference to further development of SMART supply network knowledge on how products are used and exploited. However this example also shows the flow from the production to the consumption, than the part and the layer concerning data acquisition are the most important to further knowledge development. It can be done by analyzing customer IoT data—the data that is processed after the product is bought by the customer and started to be used by the user.

Some of the companies have already initiated activities of exploring the potential of using customer IoT data to improve products and value proposition. For example there are connected coffee makes already on the market by Nespresso, Starbucks,

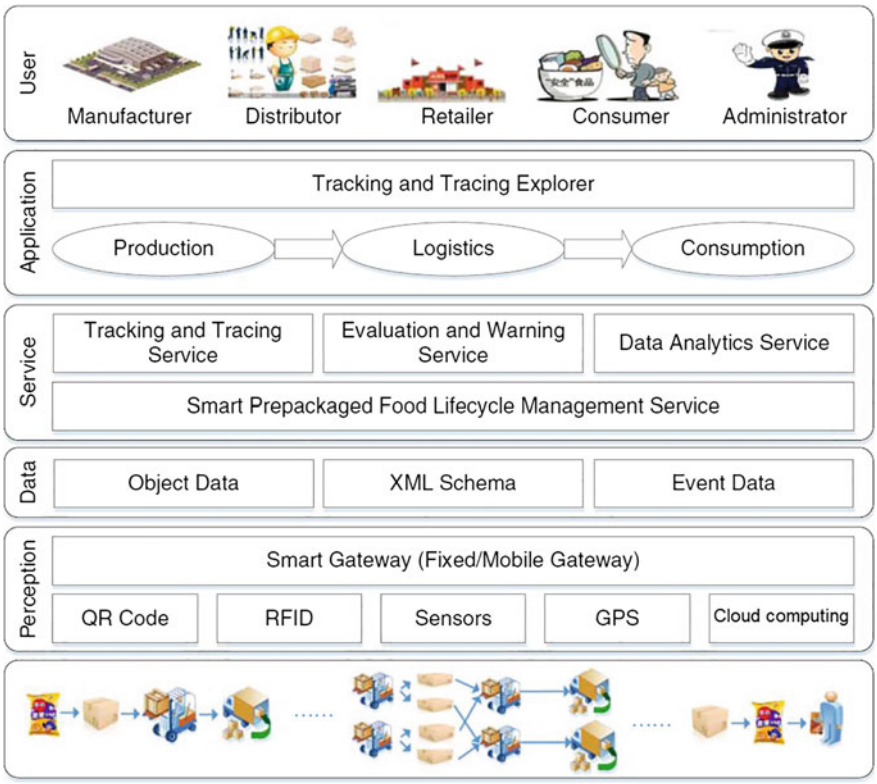


Fig. 5 Architecture of IoT-based tracking and tracing platform. *Source* Li et al. [10]

and others. With customer IoT data coming from the coffee maker, companies can find out i.e. [17]:

- how many cups of coffee customers are making every day,
- whether the coffeemaker is in a warm office or a garage,
- how well it's performing,
- how often it's being used,
- whether the coffee is hot when it comes out of the filter, etc.

One of the sectors that most extensively seeks information concerning customer behavior is the automotive industry. The information how car is driven can be a base not only for designing special features on the next model but also for other companies in supply chain or even in complementary sectors. "The feedback is invaluable for automotive companies. Automakers get to see how customers are using their vehicles. That feedback is the Holy Grail for physical product companies. Before, you had to do surveys from warrantee cards. Then they'd go to maintenance records to see if customers are driving the car hard" [17]. In this way companies can possess information about features of the product that are really important for the customer or user not just theirs opinions or hopes for the product.

For the designer of the product and suppliers of the components, data on how customers use the product can go right into the design of the next generation of the product. It can drive demand network not only based on sales level but on the base of the particular features that are important for the users, so on the base of real-usage behaviors. Such an information has exponential power in gaining supply network competitiveness. It eliminates costs allocated to the activities (and supply network links and intermediaries) that do not add value to the system. It helps offering full personalization based on the most attractive features that are important for particular consumer. Additionally, when connecting different sources of data by IoT usage, e-supply networks are able to get information on the conditions and environment in which product is used. Also the data concerning accompanying or complimentary products that associate usage of the good can be gained. All those aspects opens new potential for innovations in supply network management directly impacting its competitiveness.

Customer IoT data is a new starting point for e-supply network development. The information on how in fact the product is used by the customer might also recreate the customers' experiences and customer journey in a very different way. It can offer him a new solutions that coexists actually not only with the product, but with the each feature of the product that is the most attractive and important for the particular person—customer or user. In this way it reduces supply network risk of offering value proposition that is not in 100% adequate to the expectations and needs of consumer. Therefore the Fig. 2 presented at the beginning of this chapter should have at the beginning the identification of the value based on customer's behavior during the real usage of the product.

Additionally this concept is consistent with SMART supply network idea. The usage of customer IoT data impacts on Sustainability in terms of eliminating wasted materials or other resources that are not important and unnecessary from the perspective of value created for the customer. The concept is Modern in terms of the number of the solutions implemented as practical cases impacting supply network management and business model reconfiguration. This solution also helps supply networks to be closer to the real needs and expectation and when using digital technology it creates Adaptive e-network. This flexibility is a main pillar for Robust supply chains that are able to adapt to any changes actively creating customers' behaviors. It is only possible due to the fact that such a supply networks are based on modern digital solutions and are Technology-oriented.

Of course, as in any other cases, it is not a perfect solution. Especially due to the fact that it is new and not very much popular yet. Therefore, when revising potential of implementation of this concept, the following aspects should be taken into account:

- Data privacy—does the company observe product or individual customer?
- Compliance with actual regulations concerning sharing of data and its protection.
- Ability (technical and mental) to build transparent e-supply networks that requires partnerships—trust and risk sharing. Standards and protocols need to be in the place for the format of data emanating from sensors.
- Ability (technical and mental) to share data between companies from different sectors and different supply networks—building interoperable system that easily connects new links and reconfigure business model.
- Understanding of the role of innovation and ability to quick response to the market or customer needs fluctuations.
- Users willingness to share the data of product usage.
- Supply network should be equipped in the technology that enables smooth data flows (sensors, IoT, cloud computing platform, GPS, QR codes, Big Data Analytics, etc.).

At this level of development, this solution is probably also determined by the supply network that is integrated and has strong, visible leader who is able to implement a new strategy and manage change across the entire network. Therefore this solution might be in special interests of innovators that are not afraid of use unused potential of e-supply network management driven by customer IoT data.

5 Conclusions

When the product or service idea is identified, for the company it is extremely important to recognize the real value that the customer experience when using the product after purchase. The following aspects might be crucial to be able to build

business model that supports customers' expectations in the most suitable manner (www.predictableprofits.com/the-10-most-powerful-questions-to-ask-when-developing-a-new-product-or-service/):

- How they would use the product?
- What do they expect from it?
- What problem will this help them to solve?
- Would they be willing to purchase it?
- What value would they put on it?
- What other products in the market place would they consider instead of this?
- What do they like about the other competing products on the market?
- What are the existing products on the market lacking?
- What would help them decide to change to your product?
- Would they even consider using your product if they are already using a competitors?

E-supply network based on the SMART concept might be the solution that helps to recognize personalized needs and adapt resources to build supply system that meets the expectations and eliminates unnecessary costs. This supply network is technology-oriented. Its base for gaining on value is the ability to recognize real type of product usage by the customer after it is sold. To be able to build such a supply network the customer IoT data solution should be introduced.

Customer IoT data is a starting point for modeling e-supply network in the way that plan, source, make and deliver processes are initiated when the particular and important for the company need of the customer is recognized. Those e-supply networks are than driven by real-life usage of the product and not on the opinions, expectations or hopes that customer might have. In this way managers are able to build personalized supply chains that include only justified operations and costs. They can eliminate wasting time, money and therefore develop in a sustainable manner.

In each case this concept must be revised in terms of compliance with regulations and, especially data privacy. It also requires integration within supply chain and a leader that is able to introduce adequate strategy into the whole system.

So, does e-supply network management use its current potential? Today—definitely not. But due to the described reasons, the concept will be probably primarily used by innovators. And it will happen very soon. However it should not be rejected by any of the supply chain manager who wants to crate competitive e-supply chains of the future.

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