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Role of Visibility in Supply Chain Management

Zulkaif Ahmed Saqib, Khubaib Ahmed Saqib and Jin Ou

Abstract

It is substantial for manufacturing industries to enforce and seek out new strategies regarding supply chain management to endure within the current competitive and capricious business climate which is critical. We try to underlie a policy for manufacturers to connect all operational issues related to the supply chain. This chapter suggests a concept of visibility that represents a beneficial role among business partners such as manufacturers, supplier, and customers. The categorization of several types for uncertainties in the supply chain such as demand, quality, broader variety, time, and customization of a product are related to the decision-maker. Management of uncertainties applicable with the help of sharing the information creates visibility among supply chain partners. Implementing supply chain visibility becomes easier just because of passing information about products globally which is more a matter of priorities and investment, which is not the case when sharing “official data” about people. As social technologies become more prominent, this may change over time. So, supply chain visibility is beneficial for supply chain partners.

Keywords: visibility, information sharing, manufacturing industries, supply chain management, customers

1. Introduction

Different appliances for manufacturer and distributor are facing at a crossbreeding in the supply chain network. Throughout the years, the appliance producer haunted to build up a considerable connected network among supply chain partners to sustain its high criteria for customer support. Nevertheless, different manufacturing industries controlled neither visibility into nor control over how to sanctioned peculiar service center's operations [1]. The manufacturer ran out from an efficient and competent procedure for sharing data about replacement parts as well as warranty. The manufacturer has known that if it keeps further on its direction as regards worldwide growth, it had to discover new ways in favor of surviving in this competitive environment and need to increase its supply chain visibility with the help of sharing information and data to monitor, supervise, as well as amalgamate the critical piece from its own business [2, 3].

Mostly, manufacturers' focus on several projects for supply chain visibility is to equipping more accurate, precise, faithful, and rigorous real-time portrait of demand, quality, and price indications or information about supplier's inventory levels [4]. However, manufacturers are the commencement to strengthen visibility while facing an increasingly complex directive climate which is a support to encounter compliance and obedience guidelines which are associated with different kinds

of business practices, ecological mandates, forthcoming serialization approach, as well as track-and-trace laws and regulations. Classified and more conspicuous domains are important for sustainable development where the advanced shape of supply chain visibility intervenes as regards to play for ecological compliance [3, 5–8]. Rules, regulations, and laws for provisions like Evaluation, Registration, Restriction, and Authorization of Chemical Substances elicits the manufacturers toward responsibility in favor of monitoring and handling the hazardous chemical materials as well as substances.

These mandates might be entirely considerably costly to redesigns, discarded components, pluggable consignment, feasible consumer's disappointment, and perhaps extortionate charges as regard the implications for manufacturers that are not on top. Most manufacturers are remaining utilizing the manual processes to retrieve spreadsheets, even indigenous databases for domestic companies to accomplish and organize this data according to their supply chain network. On the other hand, a huge assortment of several products provided by enterprises from supply chain network which declared as suites or sets for product lifecycle management (PLM) that are appending functionality to promote manufacturers automate according to their processes. Moreover, a successful track system and controllable monitoring system might be enhancing the environmental performance of their products with the help of sharing information (visibility) as regards to supplying chain management.

In this chapter, we will try to explain the answers of questions which are related to visibility role in the supply chain. These questions are: What is visibility? How could all these terms on supply chain visibility, logistics, sustainability, traceability, planning, the inventory level of supplier, and execution be identified? Why is visibility important for the supply chain? What is the value of visibility for supply chain network? And lastly, what are the benefits of SCV?

2. Supply chain management terms

Supply chain management (SCM) can help maximize customer satisfaction and boost profitability, but it is also rather complicated and requires collaboration across the entire enterprise and beyond. SCM covers the several kinds of processes in the supply chain from planning, controlling, organization, and procurement of raw material to production and distribution level to the final destination that is necessary to get a product out of the warehouse and to the customer most efficiently and effectively. Because SCM lies at the core of many businesses, it is crucial to have a strong understanding of the processes involved and how they differ. To start, we have compiled a list of seven supply chain management terms to be explained to both organizations and customers which they should be familiar with:

1. *Logistics*: logistics and SCM are often used interchangeably, whereas SCM covers an extensive scope of operations and activities required to organize as well as produce life of a product's journey from the factory to the warehouse and then to the consumer; logistics only focuses on two essential constituents in the supply chain: transportation and warehousing.
2. *Sustainability*: supply chain sustainability focuses on the big picture about ecological, social, and economic issues, including legal issues related to supply chain. Organizations have to consider several problems that could affect SCS, such as air pollution, wastage of hazardous material, leakage of carbon footprint emissions (CO₂ gasses, etc.), labor violations, and desertification related to health and safety issues of workers. The final intention is to implement

all practices related to environmentally, social-friendly as well as to improve the encouragement as regards positive brand awareness within a competitive environment.

3. *Traceability*: companies can benefit from implementing traceability, the ability to identify and track the components that make up a final product. It essentially allows a producer, distributor, or supplier to inspect for any issues that may arise before or after a product reaches the consumer. The recent contamination outbreak that was linked to romaine lettuce in the USA is a great example. This is the most accurate and efficient way to find out what went wrong and where and, in some cases, prevent the problem in the first place. Without proper traceability and best practices, companies especially larger businesses would not be at danger level of failure about millions in production costs, sales, different kind of charges, as well as legal bills, although all these businesses will necessarily put and invest to their final consumers at any level of danger as well. Fortunately, national and international laws address economic, health, or environmental concerns and enforce traceability across several industries.
4. *Planning*: supply chain planning is used to balance supply and demand, forecast future needs, and ensure adequate supply to meet those needs. It starts with a demand plan, which gathers all the necessary data and information in one place before translating it into the respective planning, execution, and distribution processes. Once approved, you can then create a master production schedule that will monitor items across the supply chain by location, inventory, order, production time, and quantity. Other critical elements of SCP that help the business plan for the future are consumer forecasting and supply collaboration.
5. *Inventory management*: tight control of inventory can be crucial to a company's success. By implementing inventory management software, you can keep detailed records of every product or material that goes in and out of the warehouse, whether it is new or returned. The lot and serial numbers, quantity of goods, and cost of goods are just some of the data employed in inventory management. There are also specific techniques or methodologies to inventory management such as stock review, just-in-time method, and ABC analysis that ensure you have the right amount of materials to meet demand at the lowest possible cost.
6. *Execution*: one of the more common supply chain management terms, SCE, focuses on all of the actions needed to get a product to the customer before or on the estimated date of arrival. That includes the monitoring procedure for the goods as well as materials as they arrive and move through the warehouse and scheduling of transportation services to deliver the final product, as well as the financial transactions. By doing so, SCE applications, which are often connected to SCP systems, also give customers the ability to track a product and receive updates.
7. *Supply chain visibility*: SCV is one of the more valuable supply chain management terms because it offers companies and their customers more time and actionable information about their supply chain orders. Manufacturers and retailers can pull information from SCV software that they can share with customers so they can track their orders in real time. If there is a disruption or issue while a product is in transit to its final destination, SCV will quickly provide data that give manufacturers the fastest option to redirect the supply.

To put it simply, SCV's main objective is to enhance as well as intensify the supply chain by providing accurate real-time data to all parties involved. Furthermore, manufacturers remain employing SCV to encounter conformity enforcement such as those associated with business practical exercises, environmental demands, upcoming serialization, and track-and-trace laws.

Today, all best practices for supply chain management are regarding the development of the imagination of the big picture as well as all sustaining deeds and actions required to comprehend that situation. Different objectives such as a prosperous aqueduct strategy, sustainability (environmental, social, and economic), as well as supply chain visibility are faultless models for accomplishments that are the impossible absence of a major rank of orchestration, instrumentation, collaboration, and leadership. A supply chain operating smoothly could also progressively incorporate complicated technology, machinery, as well as the methodology that could provide bigger insight, visibility with regard to sharing information, implementation, inventory management, planning, and traceability from the association of digital supply chain and manufacturing procedures to analytics.

Visibility: the strategic importance of supply chain for manufacturing sectors of an economy makes it paramount that companies measured their performance. Performance measurement in the context of the time, quality, and cost are of high importance to manufacturing companies [9]. Each manufacturing company competes with large companies within different industries such as textile, cement, sports, garments, furniture, auto, electronics, and agriculture. Competitive advantage is an arduous task for companies to gain within a competitive environment. There is increasing attention within the ground of supply chain management. Furthermore, also attention has deemed toward the importance of information sharing.

Information sharing about components or products, raw material components, during carriage out to transit could be tracked from the manufacturer to their final destination or consumer called as visibility in supply chain or supply chain visibility (SCV).

By collecting and sharing information from multiple organizations, information sharing (visibility) can present their members with a detailed picture of malicious activity taking place within a specific sector or geographic region. Member organizations can then use this information to individually and collectively block attacks they may not have known about otherwise. Organizations can get benefit from joining some information sharing activities in several different ways. By sharing and receiving actionable cyber threat information, organizations can gain an enhanced understanding of their threat environment and make better and more timely decisions about how to allocate cybersecurity resources to defend themselves [9–11].

The final destination of SCV turns into enhancement and effectiveness of the supply chain network by developing data directly accessible to all interested business parties, including the customers, suppliers, buyers, as well as producers. SCV contains additional momentous roles among companies. Companies should have delocalized different components for the whole supply chain as well as lost the control and the visibility achieved over what used to be part of operations. In supply chain network the visibility (information sharing), technology facilitates and quickly responds to the transformation which is allowing to favored users to take action and reshape product demand or divert supply. The integration of the chain, both internally and externally, through information sharing (visibility) could bring an improvement for the supply chain achievement. On the other hand, visibility becomes a fundamental thought for logistics activities according to supply chains; it establishes appropriate information sharing process among supply chain

managers such that it permits them to be experienced and knowledgeable to all appearances of trade. It enables the manufacturers, shippers, retailers, suppliers, as well as consumers to possess an opinion precisely about the supply chain and their products that are located.

The concept of the exercise of new technology, methodology, and procedures to accomplish comprehensive visibility across the whole supply chain is not a new concept; because in 2000, all appearances were not initiated as regarding to the supply chain sustainability management and the exercise of a different kind technology get more control to maximum level. Furthermore, the development of these exercises related to different kinds of technologies showed up at about a point in time when each manufacturing company was searching a fresh supply chain technology, strategy, and process by means of resolution to the provision of world peace and world hunger [12]. Visibility within supply chain enables the suppliers, manufacturers, retailers, shippers, and even final consumers to have that concept of accurately where conjointly the supply chain their products positioned. At each indication point conjointly to the supply chain, the flow of information from the termination line of the raw material from the supplier side to the launching point of customer contact (final destination) approached.

A business instance about procurement in supply chain and visibility software requires to concentrate on alleviation torment queries in a specific supply chain management system in the business. For example, the basic preference in favor of a producer who makes basic arrangements according to agreements and commitments with the subcontracting condition could be obtaining perfect visibility into disruptions that might create a serious strike to product delivery, whereas the priority for a producer of wrapped finished goods could also be obtaining profile into supplier inventory shortages that could have a negative effect because of order fill rates (see **Figure 1**). Furthermore, visibility could be obtained from the convenience of economical sensors and connectivity through Internet components which have created supply chain visibility which is easier for producers in the last few years. Exactly, it's feasible to understand about the location, time, and surety. For example, in many cases consumer want to track at any time about where are goods, and what condition the goods could join.

In addition to offering a correct, real-time image of requirement indication as well as supplier's stock inventory levels, producers are utilizing the visibility concept as a strategy to help satisfy acquiescence instructions relevant to business practices and practical, ecological demands as well as forthcoming serialization and different kinds of track-and-trace laws. In various industries, supply chain visibility applications are arranged with misfortune healing plans. For instance, the consolidation of supply chain visibility of different techniques and new technologies as a resource for enhancing on-time delivery set out an apparatus that might be offered considerable achievements to consumers contentment and satisfaction level. In a latest research on supply chain superior methods for the survey, the results showed that to carry out 100% on-time delivery satisfaction, manufacturing firms had to have elevated inventory level in hand for several weeks [13]. The closing inventory is directly influenced the holding and operational costs overall. The fundamental perception as to whether or not visibility provides several resources for advancement as regards delivery time becomes very crucial to the supply chain industry with these

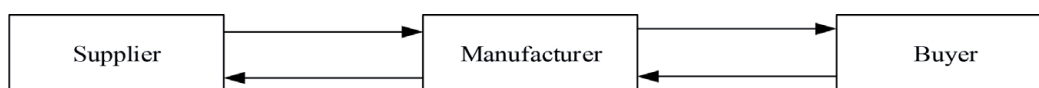


Figure 1.
Supply chain management and visibility (information sharing).

difficulties. Supply chain performance indication has an excellent function with respect to the company's strategies.

Moreover, the buyer's contentment is indispensable to the diplomatic practicability of a manufacturing firm and conventional to the ambitions for the buyers which could be offering a durable business association for a firm (see **Figure 1**). Part of congregation a consumer's anticipation includes harmonizing the output to measure the supplier performance with the strategic goals; this means if a consumer worth is unfluctuating delivery as distinguished from fast delivery, then it is essential as a supplier to have delivery done on time as distinguished from concentrating on short lead times [14]. Visibility (information sharing) in which buyer and suppliers share non-incident information, such as cybersecurity best practices, training opportunities, and unbiased product information, can help organizations develop more effective vulnerability mitigations and reduce the frequency and impact of security incidents., Visibility is all about sharing information. The central issue is people often of diverse business, demographic, or national cultures, working to find shared value. As we know, no information system can operate without people. Implementing any system requires change management. If policies are in place and people do not use the data, it is of no value.

Why is supply chain visibility important? You are unable to manage a business sightlessly or blindly in a competitive environment. Today, supply chain visibility is an essential instrument for the accomplishment of a company. However, deficiency of synchronization within the performance of the different tasks often occurs when the individuals within an organization did not completely understand and comprehend all activities, operations, production process, and work in process one level below or above their position within the supply chain network [10, 11]. Nevertheless, it is feasible from the enhancement of transparency and visibility throughout the whole phase of the supply chain. Produce opportunities and possibilities for individual's motivation within several departments to share ideas and collaborate [15]. Furthermore, there are several types of technology and tools that help to make it simpler and simple to the enhancement of supply chain visibility in an organization. However, we examine three different types of factors that might be helpful in the process:

1. *Reduce risks and costs:* visibility (information sharing) will guarantee that there are no stoppages within operations as regards the supply chain. Organizations would be possible to speedily answer all requirements across the whole supply chain, such as reorientation of supply. Subsequently, the implementation of visibility in supply chain will be guaranteed to all manufacturing companies which would create the possibility to re-evaluate portions of inefficiency and, in turn, minimization of all kinds of risks such as defective products and different kinds of faults as well as blunders. Supply chain visibility has been demonstrated to present a return on investment. Also, manufacturing firms that provide supply chain management would be able to find a reliable, trustworthy, as well as cost-effective service plan.
2. *Improve performance:* enhanced supply chain visibility will be helpful for the greater performance expectations and estimate future demands, ensuring an organization which can help out to meet future goals. The performance will be optimizing through communication among all partners throughout the supply chain network. Also, visibility in the supply chain will provide that firm is maintaining stride with modifications in rule, legislation, and control system approximately transportation and transmission services. Employing the up-to-date technology in supply chain management can provide a better

solution to continue at a high level of the respective task as well as accomplish an analyzable performance.

3. *Identify problems*: A basic consequence of supply chain is enlarged communication which will be improved by visibility correspondingly accommodating to industrial firms to understand someplace gaps occur in the structure. Sharing information between organizations and departments might offer an overall view of the entire process. In a competitive market, customers are less likely to tolerate delivery or product errors. Supply chain visibility is crucial in preventing order errors and will prevent customers from taking their business elsewhere.

Supply chain visibility guarantees that the company is enlightened about each feature of inventory as well as permit to better help consumers by enhancing the performance and minimizing all errors. The remitter in place and the correct infrastructure might be support to a manufacturing system among all parties to accomplish better supply chain visibility and consequently improve performance, reduce costs as well as identify problems, in conclusion improving company's growth and reputation. If producers are not sure about the flinch point, about inspection and analytics professional then who can analyses the current position in the supply chain and who can implement a plan that suits to an organization.

3. Achieving strong supply chain visibility

The term supply chain visibility is so widely used; it has almost lost its meaning, so some clarity is vital up front. When most people use the term, they mean inter-enterprise, current state, or real-time information about the product from creation and as it moves and transforms across the chain. Compiling data from potential data sources is not visibility.

Other characteristics of visibility may include transaction data-like purchase order and source destination or metadata about the product, such as price, rev, part, or SKU number. Data about the supply chain, the supplier, the carrier, or customer may also be necessary. This data would be application- and user-specific to support the specific process needs. Today we can access a broader range of data about the supply chain provided by streaming location-based data such as GPS/GIS and temporal data, weather, temperature, and social events. That is important to understand how current conditions interact and affect the operation of the chain or the product.

On the other hand, offering a better faithful, real-time picture of mandate indications or supplier inventory levels is the concentration of majority of the producer's projects for sharing information according to supply chain visibility. Nevertheless, in confronting increasingly complex regulatory surroundings, producers are the commencement to desire improved visibility among all parties to help meet compliance directives related to trade practices, environmental mandates, and upcoming serialization and track-and-trace laws. One of the more conspicuous regions where improved visibility in the supply chain arrives into play is environmental compliance.

“Compliance is an up-and-coming factor, and manufacturers are expecting a lot more regulations for environmental compliance, around packaging for trade compliance and things like pedigree, for understanding where your product is coming from,” said by Noha Tohamy, vice president of research at AMR Research, a Gartner company.

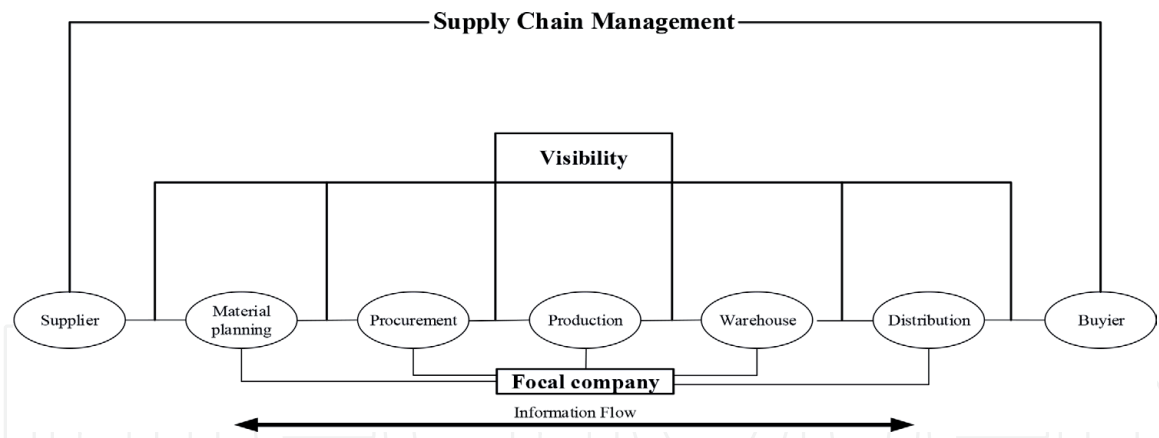


Figure 2.
Product life cycle management.

The bifurcations for producers that are not on top of these demands might be entirely considerably expensive scrapped parts, redesigns, potential customer dissatisfaction, blocked shipments, and per chance steep extra charges (see **Figure 2**) [16]. Majority producers are peacefully utilizing manual processes, spreadsheets, even homegrown databases to redeem and supervise to handle this data with the whole supply chain. However, an assortment of manufacturing systems is inserted progressively functional capability to support all producer's computerization all manufacturing procedures as well as more efficiently track as well as enhance the environmental performance of their products. The supply chain offerings continuations related to product lifecycle management (PLM). Approaching the environmental rules and regulations approximately carbon emissions will be the authentic game changer for producers, redoubling the required for visibility resources for better solutions to assist in gathering acquiescence. For an instant, you look at what Walmart is demanding with regard to having to minimize the carbon footprint of the products that are provided in Walmart stores. On the other hand, visibility is a tremendous portion which has an opportunity to track that information because there are several parties engaged in producing carbon footprint from each product.

According to previous research, the Business Performance Management Forum and E2open, 42% of manufacturing firms have evaluated yet to take in the account about greenhouse gas emissions due to carbon footprint throughout their prolonged supply chain augmented by a supplier of on-demand supply chain management services. Furthermore, while conducting interview 76% of respondents declared to their consumers had not required such information, two-thirds anticipate them to required such information from a valid data forthcoming several years in future. Alongside ecological observance, new laws associated with the global business environment are a supplementary area where producers could get benefit from improved visibility in their supply chains [16]. Extensive business management clarifications like those from Management Dynamics, Oracle, and others automate the processes that allow producers to trade with high collaboration and efficiency throughout borders and also make sure that they pay the rectified amount of duty for the protection against penalties, fines, as well as the loss of business licenses.

4. The value of supply chain visibility

We can see the visibility value in the supply chain as few parts of enterprise operations have transformed more radically over the years than supply chain as companies struggle to navigate globalized sourcing, the rise of just-in-time delivery

models for manufacturing, and, most importantly, unprecedented customer expectations for product availability and speed of delivery [17]. To note as well, the supply chain has a “dirty underside” of fraud and theft. In these environments, owners or workers are resistant to implementing visibility solutions. We always recommend inspections and background checks of trading partners before engaging in the business of any type [18].

Ironically, while companies are using extended supply chain networks and massive outsourcing to meet these challenges, the solutions they come up with create a significant new problem of their own in the form of lost visibility. As we will see in the post, lost visibility into your supply chain means lost value. The good news is that the right telematics and related technologies can help maintain great visibility and control over even the most complex supply chain networks in service today.

Visibility creates value among the many impacts of the different store manufactures, supplier, etc., and the effect is the heightened demand for consumer visibility into availability and shipping logistics, from the first mile to the last. Not surprisingly, businesses see value in getting the right supply chain visibility to meet those customer expectations and ensure efficiencies in their operations [19]. The hurdles come in trying to implement in some severe supply chain use cases. For instance, think about the Amazon (book store) effect and the prototypical example of a book. Supply chain visibility into that book is one thing, but what if your supply chain involves highly volatile, highly valuable pharmaceutical cargo that is environmentally sensitive? You would want nuanced, real-time, and real-world data and analytics to keep that kind of sensitive cargo on track. Smart sensors and granular data mean we can provide real-time operational intelligence to not only reduce the risk of cargo theft and spoilage but also document compliance with regulations and drive operational efficiencies that benefit everyone, from shippers to the end consumer.

Supply chain visibility is connecting systems for stronger solutions for problems. Or many, additional possibilities come to life when you realize that, rather than scrap all your existing, limited capabilities in favor of some brand-new system, you can create new visibility by integrating and strategically augmenting many of the skills you already have. For instance, look at any tractor-trailer on the highway today, and you will likely see a telematics device in the cab to track location, a separate system that is monitoring cargo temperature and a third system for security to protect the valuable cargo from theft or tampering. That is a lot of duplication of systems and services for what remains silos of uncoordinated insight (see **Figure 3**).

What if we instead choose to fold in point solutions and targeted capabilities



Figure 3.
Systems of system.

together with more extensive “system of systems” integrations that create more sophisticated outcomes like the difference between assisted braking and full autonomous drive?

That last auto analogy is not random. Tesla took years of laying the sensors, telematics, actuators, and other infrastructure into its vehicles; the cars were pre-emptively designed to operate and engage these sophisticated systems that would not be enabled for more than a year into the future. That point in the future came when Tesla finally downloaded its first Auto-Pilot program to users who overnight were able to enable new capabilities from the underlying technology suddenly.

So, now that we realize we are not starting from scratch that we can use some of the same capabilities we might already have, but in more integrated and orchestrated ways, “how do we make this transition while keeping our business running?” In other words, once we realize we do not need to reinvent the wheel, we are still faced with having to change the wheels for supply chain visibility, while our business is moving at full speed. The best way to go about it is to focus on the infrastructure first and then introduce the capabilities when the time is right. Think back to our tractor-trailer example: we are faced with having to pick the best system perhaps see whose contract is up for renewal or whose existing infrastructure is most interoperable and weighs everything as a business decision. One way or another, try to introduce some coordinated technical standards and interoperable infrastructure for the telematics throughout your supply chain. Through real-time event architected systems, you will learn information about what is happening now that might negatively affect the people, facilities, or products. That provides the value of supply chain visibility or the ability to respond and mitigate adverse effects or seize upside opportunities.

5. Conclusion

Implementing supply chain visibility becomes easier just because passing information about products globally is more a matter of priorities and investment, which is not the case when sharing “official data” about people. As social technologies become more prominent, this may change over time. When you think about it, these ideas make total sense. So, why have not we seen more people connect the dots? My understanding is that sometimes you do not see an advanced solution until you have made enough progress in the industry to uncover the difficult business problem behind that solution, to begin with [20].

At least, that is why supply chain visibility is on our minds so much here. We are in a position as a market leader in telematics not only to see what connectivity and telematics can do today for supply chain visibility but also connect the dots on what those capabilities can be tomorrow if we bring the right vision, strategies, and tools to the market.

Benefits of SCV: on the upside, productivity and data accuracy can be enhanced significantly to benefit workers. I have worked in several plants where multiple languages were being spoken, and it was hard for workers to communicate their needs or work status. If one worker speaks Laotian and the other Spanish, they cannot explain their challenges or requests for more material to support their work centers, report quality issues, or route parts to another process. Simple scanning technologies can allow the systems to operate and the workers to communicate their needs [21]. As countries like China also become concerned about product quality and purity, they have shown a greater interest in implementing standards and technology for product trace and visibility. Global regulations in many industries have various requirements for data collection and reporting. Though collected, often,

this data is not being made available for a visibility system.

In conclusion, cultural acceptance or resistance to visibility can be national, social, or organizational. These are reflected in existence or not of local regulation or industry standards efforts. Within supply chains, profile and data sharing is more about current priorities as well as assessing the technology and its value. For the worker, consumer, and resource protection, supply chain visibility may be something we want to embrace. From preserving scarce resources and providing worker safety to making sure the products we use are safe, the trend is moving toward both visibility and transparency.

Conflict of interest

The authors declare no conflict of interest.

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