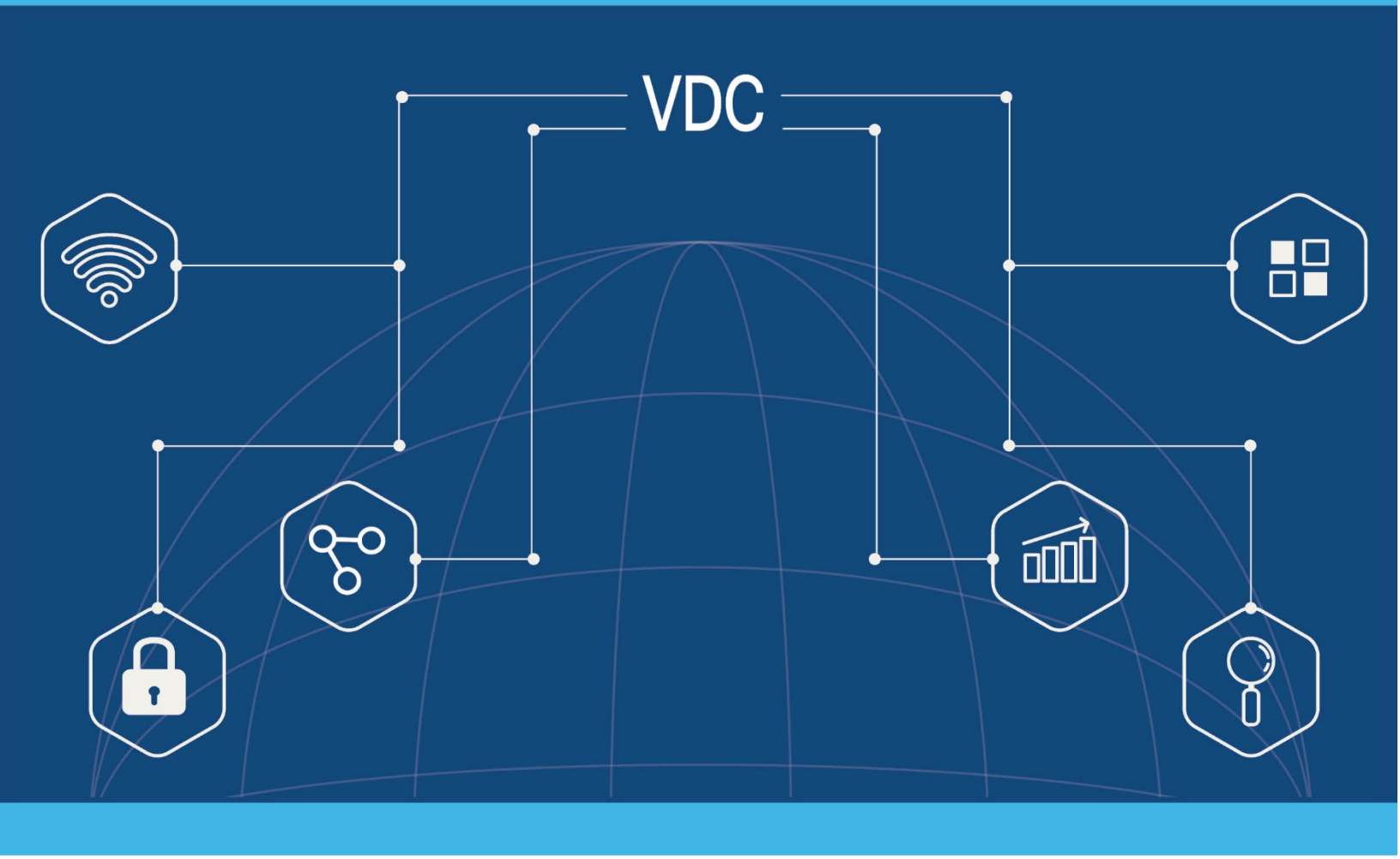
Transportation, Logistics & Supply Chain Operations

Ushering in the Next Wave of Mobility



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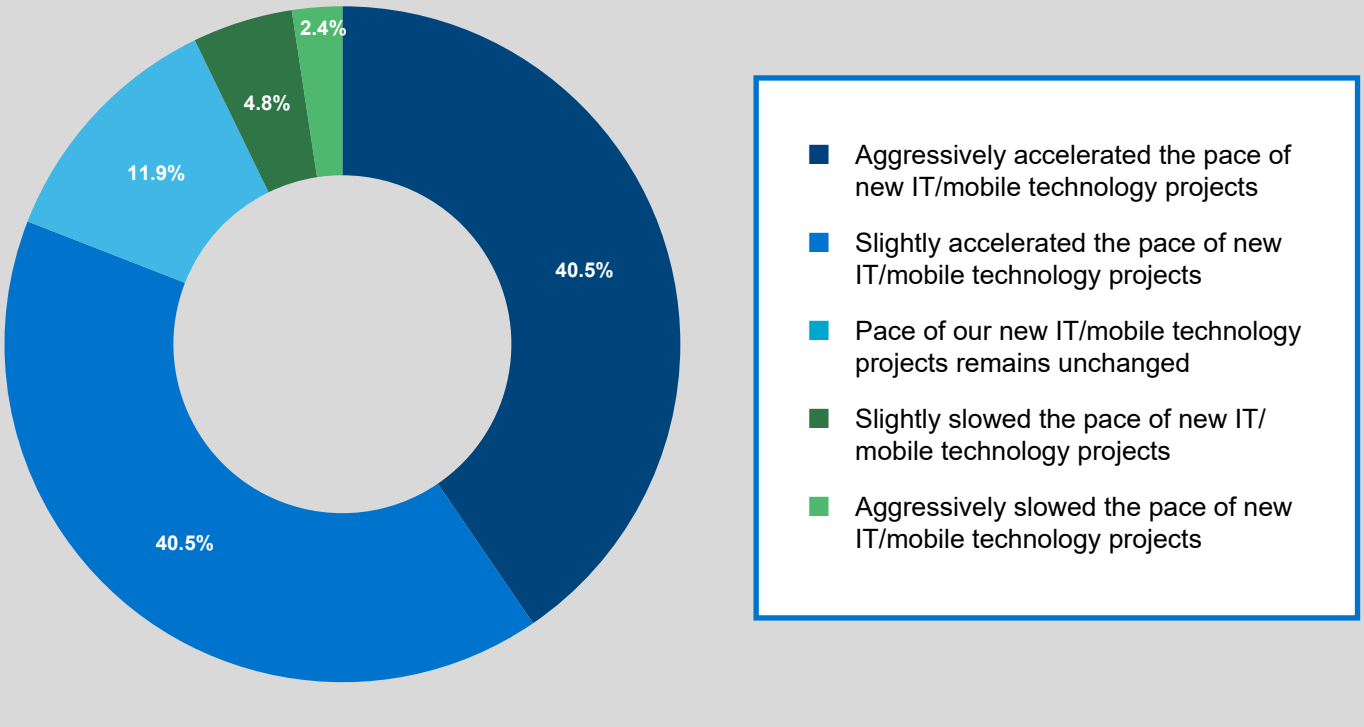
Today's COVID-19 influenced supply chain crunch is showing no immediate signs of abating and is challenging organizations with component shortages, shipping capacity constraints, and rising costs – for example container spot rates from Shanghai to Los Angeles have ballooned by 270% since the beginning of 2021. Add to that the labor challenges faced – from high turnover to labor shortages – and organizations are being forced to do more with less. For transportation and logistics organizations which rely on a highly mobile workforce – and ever-increasingly the efficient application of labor – mobile computing solutions are critical conduits to optimizing their workflows.

As organizations look to create a more connected transportation and logistics infrastructure – across all channels of transport and levels of conveyance – the need for modern mobile solutions will only become more important. In fact, over 80% of transportation and logistics organizations participating in a recent VDC Research survey suggested that as a result of the current market conditions they have aggressively or slightly accelerated the pace for their mobile technology investments to support operations (Exhibit 1). These investments will undeniably curtail the effects of the current market constraints, but perhaps more importantly will enable these organizations to better optimize their workforce – in good times and bad – for years to come.

Exhibit 1: Impact of COVID-19 Pandemic on Pace of Mobile Solution Investments



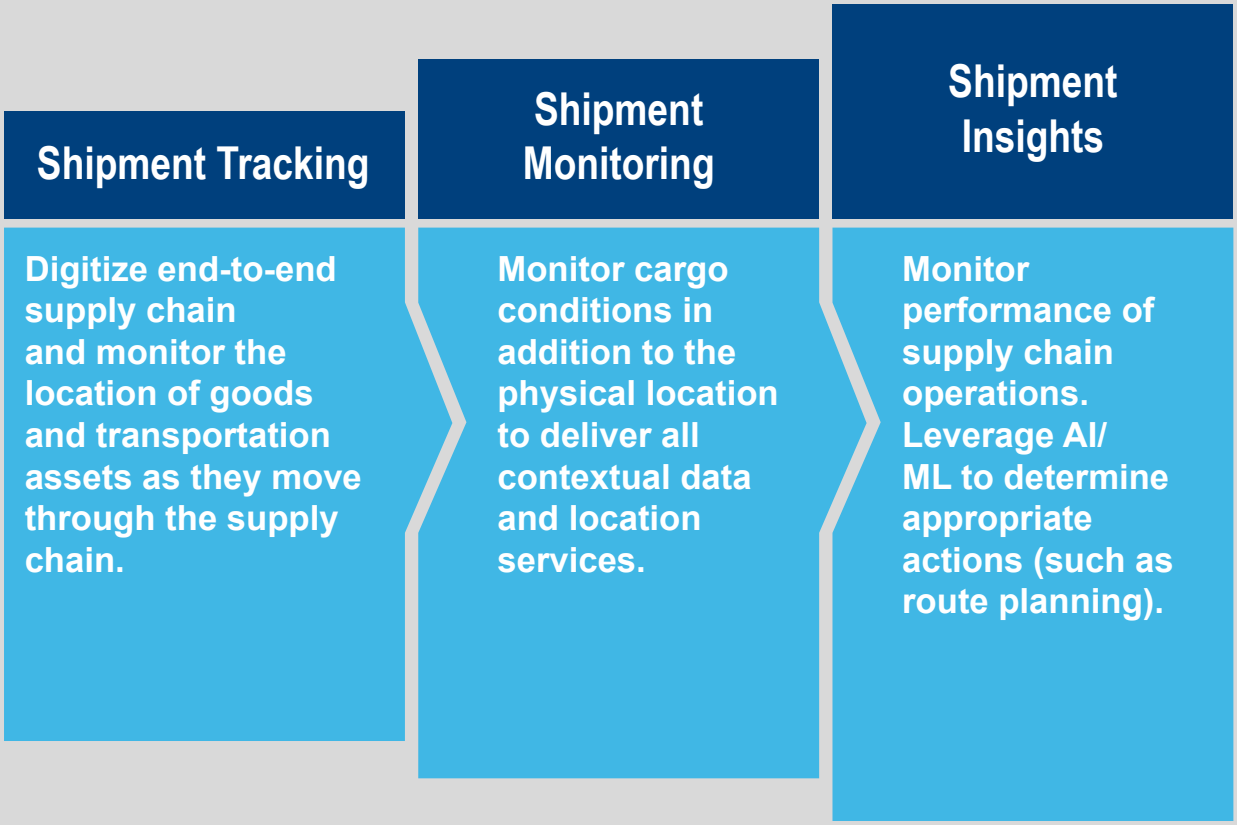
Today's supply chain is more complex than ever and the pressure to provide greater operational visibility while optimizing labor-intensive workflows is only growing. The supply chain relies on the synchronized movement of thousands of interrelated parts to meet growing customer demand for on-time, low cost delivery. The connected supply chain uses innovative digital technologies to deliver end-to-end supply chain visibility and improved business operations. Mobile computing solutions represent a critical platform to connect mobile transportation workers – from the warehouse to the delivery vehicle – to provide the necessary information to make informed decisions in real time.

Operational visibility across the supply chain is essential, not just to know where goods are in transit but to improve many elements of business operations including inventory management, customer engagement and overall operational agility.

Organizations with the highest levels of visibility into their operations and across their trading partners – from item-level inventory management to the logistics delivery infrastructure – have been the most successful at navigating the supply chain challenges over the past 24 months. This has been extremely critical during the pandemic when organizations were forced to quickly pivot, for example by offering different or alternative customer fulfillment channels. Doing this well requires a resilient transportation and logistics infrastructure to support strong shipment tracking and monitoring capabilities and provide real-time shipment insights to operators and customers alike. While transportation/logistics organizations are not new to digital solutions to support their operations, the past 24 months have significantly accelerated the pace of investment and elevated the importance of these solutions.

While operational visibility across the supply chain may have been a competitive advantage two years ago, it is quickly becoming table stakes, and will remain so as the pandemic recedes. Customer expectations are rising throughout the supply chain across both consumer and B2B domains. Above customer expectations lies regulation, which is currently amplifying the need for greater visibility and traceability solutions in sectors such as pharmaceuticals, medical devices, automotive components and food/beverage. Solutions to support real-time shipment tracking, condition-based monitoring, and insights to enable on-the-fly decision making and maximize performance and efficiency are finally grabbing the attention of boardroom level decision makers.

Exhibit 2: Supply Chain Visibility Requirements

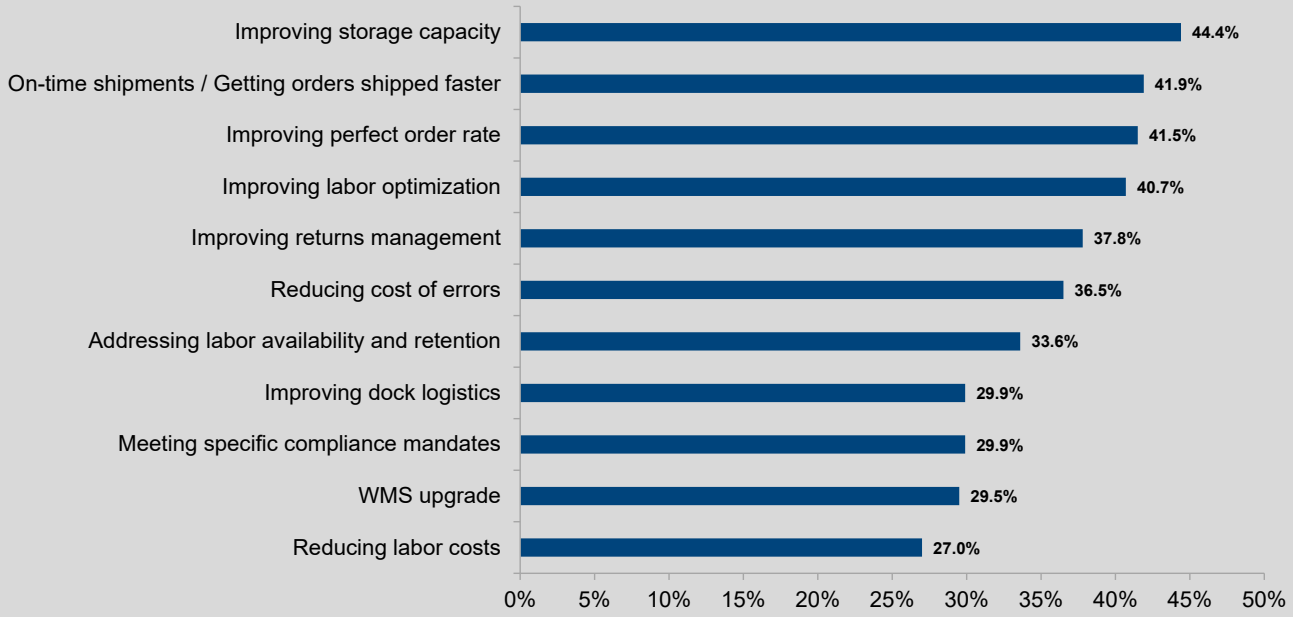


Warehouse/Distribution Center Logistics

Warehousing and distribution center operations are undergoing a significant transformation to meet the needs of today's consumers. Facing ever-increasing volumes, faster fulfillment demands and omni-channel pressures all while dealing with a growing labor shortage crisis, the time to modernize operations is now. While automation solutions spearhead many of these modernization efforts, warehouse operations remain labor intensive and equipping workers with the right digital and mobile solutions is crucial. Among the leading warehouse modernization key factors and success criteria are:

- **Diverse initiatives in warehouse modernization efforts.** From improving storage utilization to support expanding volume pressures to supporting faster fulfillment pressures and optimizing labor efficiencies, warehouse decision makers are facing mounting challenges to modernize operations.
- **Planning for mobile device diversity.** Depending on the workflow, warehouse workers leverage a variety of mobile form factors, from wearable solutions for hands-free operations to handheld computers with integrated data capture functionality. Demand for larger display tablets is increasing for applications and workflows that require greater data visualization, such as load planning.
- **Expanding tablet computing use cases.** Demand for tablets in warehouse environments is on the rise, in particular for forklift applications as an alternative to dedicated forklift terminals. The flexibility of the tablet form factor, including the ability to dismount tablets for mobile use cases like cross-docking, is a critical adoption catalyst.
- **Warehouse workforce optimization including a focus on worker safety.** The orchestration of warehouse workflows including the growing volume of forklift trucks, AMRs (autonomous mobile robots) and warehouse workers demands greater situational awareness and location-aware mobile solutions that are designed to prevent accidents from happening.
- **Evolving data capture requirements.** Barcode scanning is at the heart of most warehouse workflows – from receiving and put away to picking, packing and shipping. With the requirement to support more unique item level identification for greater traceability efforts, the use of data-rich data-carriers such as 2D codes and the associated optical scanning technology are on the rise. Beyond line of sight barcode scanning solutions, growing adoption of RFID and indoor location solutions and condition-based sensing solutions are helping automate data capture processes and free up labor for other tasks.
- **WMS and mobile application modernization.** WMS solutions are evolving from disconnected siloed solutions to take advantage of modern cloud-based applications and support real-time data from contextually-aware endpoints. A key development has been the transition from difficult to learn text-heavy green-screen legacy applications to more visually intuitive mobile applications that enable faster warehouse worker training and onboarding and more efficient workflows. High turnover and the use of seasonal workforces in these environments only amplifies the necessity of intuitive, easily learned mobile devices and workflows as organizations are constantly training new workers.
- **Mobile solutions aligned with leading warehouse improvement initiatives.** From improving storage capacity to shipping orders faster and improving the perfect order rate, mobile solutions are critical conduits to orchestrating these outcomes. As long as warehouse operations rely on labor, providing workers with intuitive mobile solutions to enable real-time decision making at scale – where and when you need it – represents perhaps the most critical warehouse operations success requirement.

Exhibit 3: Leading 2021 Warehouse Improvement Initiatives



Delivery Services

The delivery truck connectivity market has evolved from basic telematics in the past to fleet management solutions today and will continue evolving towards a fully connected supply chain in the future. With more solutions emerging, the truck connectivity market as a whole is transforming.

In the past, telematics was mainly about asset tracking but the use cases for mobile devices in the truck have grown in recent years. Considering the growing challenges impacting transportation and delivery services – from supply chain bottlenecks to managing growing variable costs and meeting heightened customer expectations – digital transportation solutions need to evolve beyond traditional vehicle telemetry solutions to address driver and inventory optimization.

Driver optimization refers to the ability to measure driver performance including contextual data relating to adverse events like hard braking or rapid, inefficient acceleration to scorecard and improve driver performance. This in turn reduces the prevalence of risky behaviors which may occur, such as following too closely. Inventory optimization in the context of delivery services related to the way shipments for delivery are distributed across the fleet to maximize capacity and optimally loaded within the vehicle to deliver more packages in less time. Either of these activities can be performed to some degree by astute operators, but the modeling capabilities of a mobile device with the appropriate software are unmatched and can perfectly optimize these processes instantaneously.

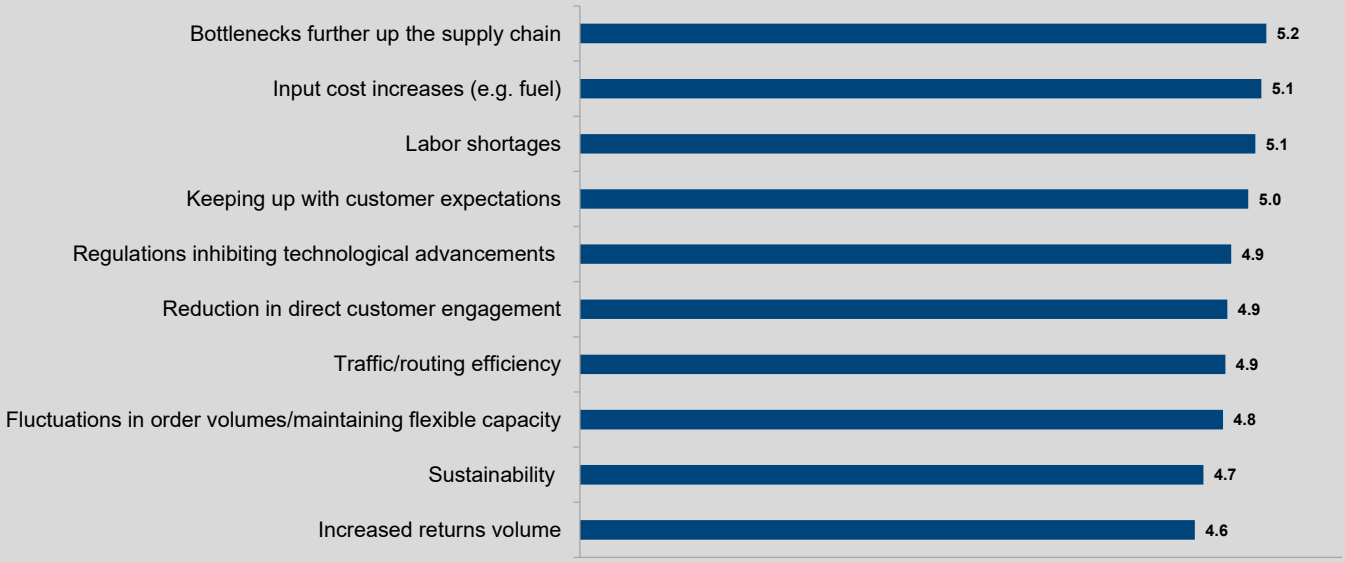
Key considerations include:

- **Evolving mobile use cases.** Current use cases include ensuring compliance with Electronic Logging Device (ELD) mandates, pickup/delivery and route planning, as well as real-time navigation which can take into account real-time traffic and weather data to curate the most efficient route – thereby reducing the number of miles driven and amount of time on the road. Reducing these two variables not only reduces the organization's fuel spend, but

also the opportunity for adverse events – such as accidents, which are detrimental to a business's bottom line.

- **Real time operational visibility.** Additionally, equipping a fleet with mobile devices can facilitate real-time fleet management with complete visibility given the devices have the appropriate connectivity and GPS capabilities; this allows data points from the entire fleet to meet at a centralized location so that each piece of information can be used to keep the work moving efficiently. Mobile devices can also be important for condition monitoring such as temperature and humidity checks and logging for compliance purposes in cold-chain and perishable goods transportation.
- **Diverse mobile form factor requirements.** Form factor and functionality requirements are highly use-case driven, with larger display tablets leveraged for applications with greater data visualization requirements such as navigation or fleet management.
- **Mobile devices to address operational challenges.** Supply chain executives are facing numerous challenges today which are expected to worsen in the future. Among the highest rated challenges of the next two years in a recent VDC survey of transportation decision-makers are fuel cost increases, labor shortages, and keeping up with customer expectations (Exhibit 4). All of these problems can be surmounted or assuaged by equipping drivers with the appropriate mobile device, but it is important to understand which are driving the IT investment to acquire the appropriate software/capabilities.

Exhibit 4: Challenges Affecting Transportation/Delivery Services



Average rating on a 7-point scale where 1=Not at all challenging and 7=Extremely challenging

Mobile Solution Requirements Supporting Transportation/ Logistics Applications

Mobile solutions supporting transportation and logistics workflows represent a business critical conduit to maintaining operations. In fact, enterprise mobility solution decision makers cite device reliability as the leading selection criteria as mobile device failure leads to workflow disruption and loss of worker productivity. As such, reliability of mobile solutions is at a premium to avoid operational disruption as a result of device failure.

There is no "one size fits all" mobile solution with form factor and functionality requirements differing by workflow and application environment. In addition to reliability and durability, leading mobile device selection criteria in these applications include mobility, battery life, ease of use, and security support. Of course, integrated RFID and barcode

scanning capabilities are critical in logistics and warehouse applications. Ease of use is key to reducing a mobile device's total cost of ownership in an industry with such high labor turnover and the requirement to onboard a seasonal workforce each year during the holiday season. Key considerations when evaluating and selecting mobile solutions for transportation/logistics workflows:

- **Maximizing operational uptime.** According to VDC's research, frontline workers lose over 70 minutes of productivity with each mobile device failure. In addition, IT spends on average 63 minutes to address each incident. Ensuring that mobile devices can meet the rigors of transportation/logistics workflows – including exposure to extreme temperatures, excessive vibration and the potential for dropping devices – ruggedized devices designed to meet the strictest MIL-STD-810G (recently updated to 810H) specifications are critical.
- **Aligning mobile device with worker environment.** If the operator works outside they will be exposed to extreme weather like rain, sleet, and snow, heat and humidity and will need a device which is not only is equipped to handle the harsh environment, but one that also can be operated while wearing gloves. Additionally, operators who work outdoors will need a sunlight readable screen for bright outdoor use. Even operators who work exclusively indoors can experience extreme environments. Operators may work in cold storage environments and need a device which can handle that environment as well as usage with gloves. Even more so, if the operator moves between cold storage and dry storage, condensation can occur, and they will require a device which can handle that extreme variation and condensation.
- **Multiplying connectivity requirements.** Connectivity requirements vary depending on whether the operator is in-premise, in a warehouse or in a truck, port, or railyard. Wi-Fi has limited range, so while it may be sufficient for small warehouses, cellular connectivity is required to maintain connectivity both on the road as well as in ports, railyards, and larger warehouses.
- **Holistic approach to managing mobile estates.** With the growing strategic importance of mobile solutions among transportation/logistics frontline workers, organizations are taking a different approach to managing their mobile estates as they look to limit their exposure to potential disruption and mobile solution failure in the field. Decision makers are looking for greater visibility into mobile solution performance – spanning the device, applications and networks – to make informed decisions about solution health and, where possible, address vulnerabilities ahead of failure.
- **Battery performance.** According to VDC's research, over 35% of respondents claim that batteries do not last the entire shift. Declining battery health resulting from years of all-day use is an all too common factor in device downtime while also representing a significant expense for organizations to manage. Providing visibility into battery health and inventory vastly reduces the challenges of this frequent point of failure.
- **Security from the ground up.** While there is no perfect security and all organizations have vulnerabilities in one form or another, security has become an economic imperative for every organization. The attack surface on mobile platforms is broad (Bluetooth, NFC, Wi-Fi, GPS, etc.), and the pocketable nature of mobile devices makes possessing the ability to remotely lock down and wipe devices critical, particularly for end users with access to corporate data and applications.

Conclusion

In today's fast-paced and resource constrained environment, ensuring efficient and optimal operations is paramount. With labor, real estate, and other inputs like fuel and vehicle maintenance coming at a premium, it is imperative that organizations protect their margins by equipping operators with a rugged mobile device suited to their workflows. The correct device will enable them to maximize the utilization not only of their labor, but also of assets including warehouse and trailer space, all while improving fulfillment accuracy and facilitating the shift to item level fulfillment. Over 80% of transportation and logistics leaders have amped up their IT spend in the wake of the pandemic and organizations which do not respond risk being left behind.

The organizations which were least disrupted by 2020's COVID-19 shock and 2021's capacity crunch were those which invested in their IT capabilities and enhanced their operational and inventory visibility prior to these events. However, the importance of these capabilities in uncertain times should not cloud their necessity in terms of efficiency and competitive edge under normal operating conditions: these capabilities are paramount to operating a competitive organization in supply chain environments throughout the coming years, regardless of which constraints may be faced. Organizations without crystal clear visibility and on-the-fly agility enabled by their operator's rugged mobile devices will be left in the rearview mirror. Pen and paper or spreadsheet-based operational planning will prohibit organizations from achieving the necessary agility to compete in today's highly agile, data-rich supply chain.

About The Authors

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David has more than twenty years' experience covering enterprise and government mobility solutions, wireless infrastructure and automatic identification and data capture technologies. David's research focuses on the intersection of digital and mobile solutions with today's business and mission critical frontline mobile workforce and how organizations are leveraging mobile solutions to improve workforce productivity and enhance customer engagement. David's consulting and strategic advisory experience is far reaching and includes technology and market opportunity assessments, technology penetration and adoption analysis, product and service development and M&A due diligence support. David has extensive primary market research management and execution experience to support market sizing and forecasting, total cost of ownership (TCO), comparative product performance evaluation, competitive benchmarking and end user requirements analysis. David is a graduate of Boston University (BSBA).

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