

WHITE PAPER

DATA COLLECTION SOLUTIONS ARE NO LONGER OPTIONAL

» *Technology Adoption Survey Results*



DELIVERING RELIABLE DATA COLLECTION SOLUTIONS

Introduction

Competing in the new millennia, given the increasing challenges of a global economy, companies must improve their decision support capabilities to manage supply chains more precisely and productively in real time. Decisions are only as good as the information that they're based on. And, information is only as good as the data it is composed of. In the "Connected Age"¹, supply chains are evolving to smart supply networks with systems and personnel that are always connected, always on, and always mobile. The smart supply network is driven by data feeding enterprise applications and business analytics to enable synchronized decisions to support the optimal flow of goods throughout the network. Automated Data Collection technology provides for the electronic capture of data in a variety of functions and transactions eliminating nearly 100% of the errors associated with manual data capture while improving the productivity of the data collection process.

There is an old adage in information technology: "Garbage in, garbage out." While automated data collection (ADC) solutions are not new, they are evolving with the automatic identification (AutoID) technology and enterprise technologies to provide more timely and accurate data; but, more importantly, more robust data. The emerging regulatory compliance and risk management information requirements are making accurate, real time data collection about every aspect of a product and its movement through the supply network mandatory for companies in nearly every industry. More than corporate social responsibility, supply chain management must be able to track, trace, and authenticate product and monitor the environment it is in at the item level anytime and anywhere it is in the supply network and be able to document it. Companies can simply no longer risk the general recall of product or the induction of counterfeits or stolen goods into their supply networks. And they have to be able to track down the specific products and material sources in the event defective, counterfeited, or contaminated product is discovered.

As a result, Supply Chain Services, with the support of Motorola Solutions, in 2012 engaged *DC Velocity* and *Supply Chain Quarterly* industry publications to conduct a survey of their readership on the current and future use of automated data collection solutions. 131 companies across industries responded to the survey with manufacturing (shippers), wholesale distribution, warehousing/transportation, and retail companies most represented. Supply Chain Services commissioned Richard J. Sherman, president of Gold & Domas Research, noted author, researcher, and supply chain industry pundit to join the SCS staff in interpreting and presenting the findings of the research. Mr. Sherman brings 30 years of experience and secondary research to the findings insights and also currently serves the Council of Supply Chain Management Professionals (CSCMP) as Director of Strategic Development.

ADC Has Crossed the Chasm

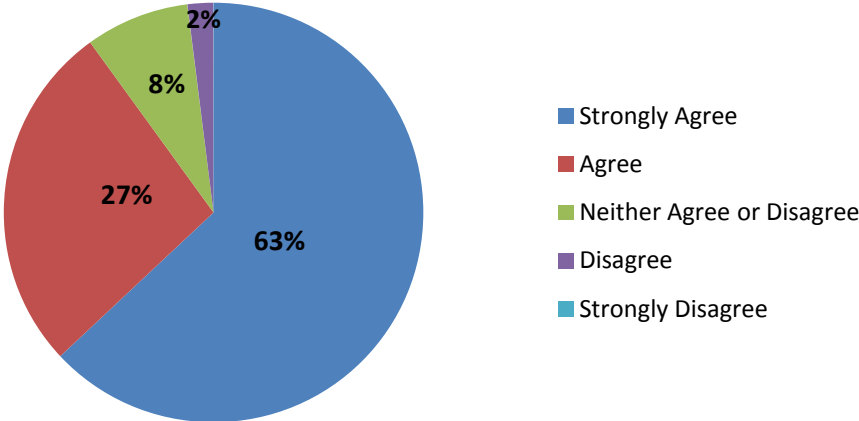
Automated Data Collection, once an emerging operations support technology, has over the years become widely adopted for increasing operations effectiveness. Figure 1 indicates that more than 90% of respondents agree or strongly agree that ADC is important to increasing operations effectiveness. As we will see in subsequent findings, the supply chain execution market has evolved to a relatively mature market. Advances in technology, reductions in cost, and more adaptable applications have evolved the traditional market for warehouse management systems (WMS), material handling, and transportation management systems (TMS) with general market availability to companies of virtually all industries and sizes. We have also seen an increase the past several years in the use of ADC technologies on the shop floor in manufacturing operations as the need for more accurate information and velocity of material

¹ Richard J. Sherman, *Supply Chain Transformation: Practical Roadmap to Best Practice Results* (Wiley, 2012)

flow have increased. Lean and Six Sigma performance improvement methods implementation has also contributed to wider adoption of ADC technology on the shop floor and across the factory.

The core tenets of WMS and material handling, in particular, require support for real time directed activity to improve operations effectiveness in receiving, put away, picking, packing, loading and shipping and have driven widespread adoption of ADC technologies. The nature of WMS transactions to support these activities is largely mobile and the inefficiency of manual input of these transactions becomes quite self-evident early on in the implementation. As ADC device technology has become more pervasive, so too has the cost of these devices come down to levels of affordability to even the smallest of companies.

Figure 1. Importance of ADC to Improve Operations Effectiveness

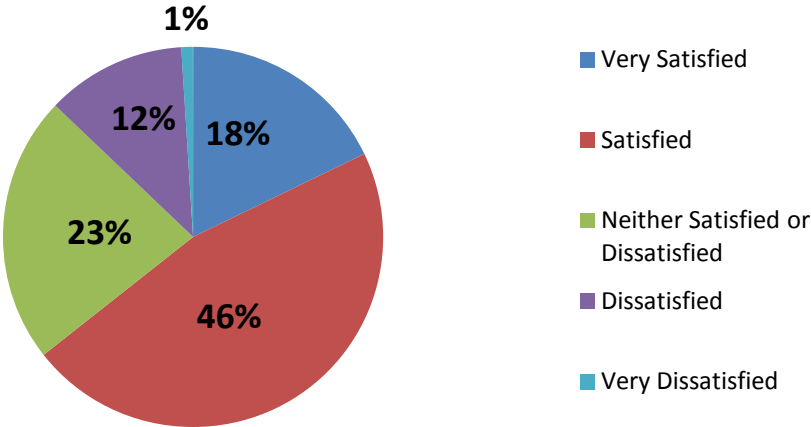


In the TMS space, depending on your role in the supply network, you may or may not see as significant an impact from ADC technologies. For example, shippers may have a limited use of ADC to support their input to TMS. Collecting load information, printing shipper and receiver labels, scanning parcels, etc. drive ADC technology adoption. On the transportation provider and fleet operations side, especially in direct store delivery (DSD) and parcel, ADC technology adoption is becoming more pervasive. Automating driver activities, tracking, and transactions are becoming widely adopted ADC applications and the productivity of drivers is an operations mandate. With the competition for drivers intensifying, driver process automation and ADC support are becoming key to recruitment and retention. Vehicle and load monitoring, telematics, and routing requirements further exacerbate the need for ADC technology. It is not surprising then to see such a high rate of agreement on the importance of ADC to improving operations effectiveness.

Complementing the findings on respondents' agreement on the importance of ADC to improving operations performance is the fact that 64% of respondents were either satisfied or very satisfied with the results of their companies' adoption and use of ADC technology as illustrated in Figure 2. 23% of the respondents remained neutral on their satisfaction with the technology while only 12% were dissatisfied and 1% very dissatisfied. Given the large number of respondents valuing the importance of ADC technology to improve their operations, we can assume that while many respondents are neither

satisfied nor dissatisfied, that their neutral response is largely due to ADC becoming second nature to respondents. We find it hard for anyone to dispute the improvement in accuracy and reduction in paperwork from ADC; however, depending on the products, volume, and environment in which ADC is implemented, ADC may be taken for granted and the results assumed. That said, very few respondents expressed dissatisfaction. Perhaps looking at how and in what areas companies are adopting and using ADC technology we may find more evidence. More importantly, let's also look at where they are headed in the future.

Figure 2. Satisfaction with Data Collection

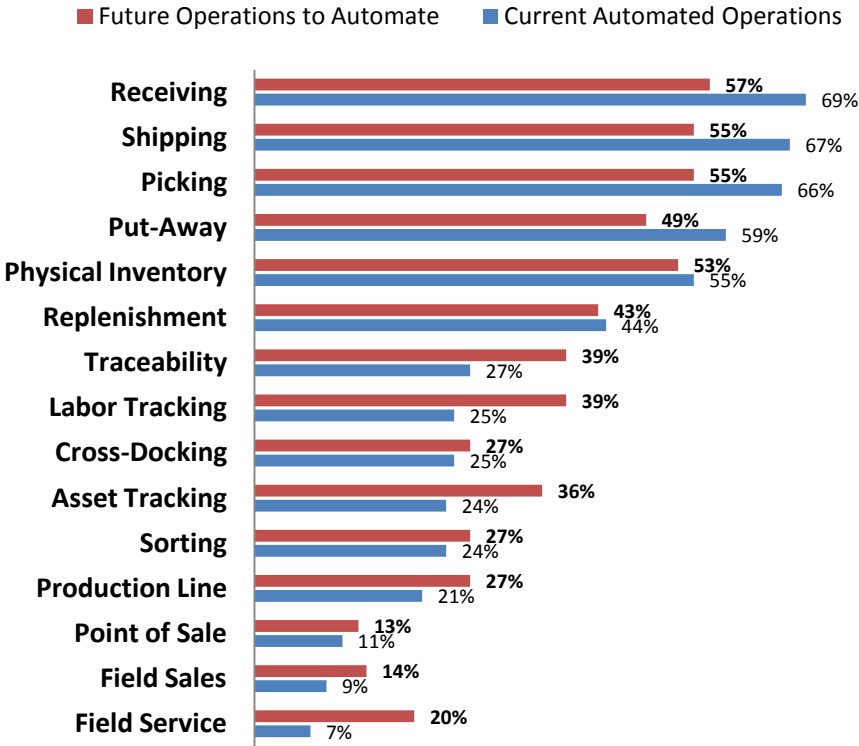


ADC Functional Use and Adoption

It is not surprising then that when we asked the respondents, in Figure 3, what operations and functions they currently use ADC technology to support; and, in a subsequent question, asked them what areas they will be supporting in the future that they identified growing needs for ADC. As we would expect from the results in question one, the areas most supported currently are in the traditional material handing applications in both manufacturing and warehousing. Receiving, shipping, picking, put away, replenishment, and physical inventory represent the areas currently in widespread use and adoption. We should point out that based on the relatively small number of transportation providers and retailers responding, we cannot make any assumptions on the relative current adoption of ADC technologies supported or in the future for transportation and point of sale areas. Secondary research would indicate widespread adoption of point of sale (POS) ADC, especially given the development of UPC bar coding almost exclusively to improve POS checkout speed and accuracy. Therefore, we will be basing any assumptions in this paper for those areas more on secondary research than from the current survey results. We can assume, however, that uses and adoption of ADC technology for areas such as Asset Management, Field Sales, and Field Service, are not currently in wide use or adoption; but, as indicated, are drivers for expanded adoption in the future.

Based on the number of respondents and the industries represented, we will assume that the adoption rate and use of ADC technologies for cross docking, sorting, and production line to be more an indication of the level of sophistication or industry requirements driving ADC technology adoption and use than the maturity of the technology. In our experience and research, automating these areas almost always requires ADC technology to support implementation. Where these initiatives are implemented, ADC technology is used to support the implementation. As these best practices become more widely adopted, we will surely see more usage. That said, the projected future use of ADC technology in these areas is clearly an indication of an advance in supply chain maturity among the respondents that is reflected in the investment plans that we will look at later. It is also important to note that the industry requirements and size of the company influence the need to implement some of these initiatives.

Figure 3. Change in Areas to Automate with Data Collection



Another emerging growth area for ADC technology is in Field Sales and Field Service, especially in the service area. When one looks at the input requirements of a Customer Relationship Management (CRM) system and the love sales people have for filling out forms and entering data (sarcasm), companies are seeking ways to streamline the data collection process. ADC technology will take several different forms including smart phone, tablet, and laptop appliances that will drive growth in the sales department. Adoption of ADC technology in field service is likely to be larger and more immediate initially due the documentation, parts, repair activities, and other cost and productivity drivers in service. More ruggedized devices are likely to be required; but, as the survey indicates sales and service ADC technology growth will be steady and robust in the coming years.

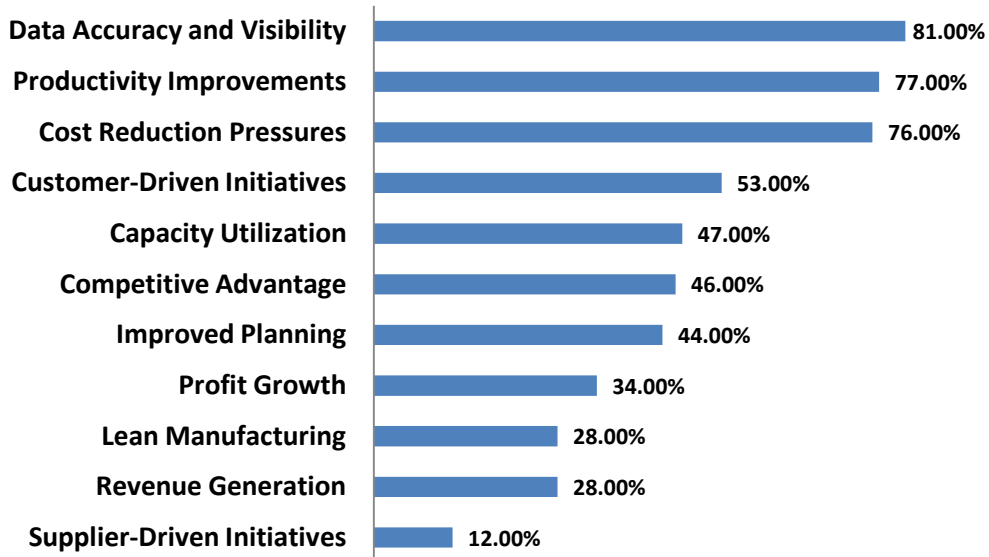
Finally, there is labor tracking, asset management, and traceability, all showing a healthy future adoption rate. Given the uncertainty of the global environment and transportation costs, many companies are rethinking their decisions on off shoring and production closer to the proximity of their customers. As labor cost was the major variable in the decision to off shore, companies are seeking to more intensely monitor its performance and lower the cost driving the requirement for ADC technology and automation to support this focus. ADC technology represents a cost effective and accurate means to track and manage assets. With the investment companies make in assets fixed, variable, and mobile, applications using ADC technology such as RFID and complementing it with GPS is driving wider adoption.

Traceability, while critical in process industries such as pharmaceutical, food and beverage, and chemical industries is rapidly becoming as important in discrete industries such as automotive, aerospace & defense, electronics and high tech, and any industry whose products have high visibility. The need to capture robust data about the sources, materials, and content of products for end to end traceability are driving not only adoption of ADC technology; but, it's also driving changes to AutoID technology as companies expand the amount of data collected and associated with the product *and* its movement and the condition it experiences, such as changes in temperature and location, as it moves through the network. ADC technologies are being deployed not only for tracking the product, but also for authenticating the product. Nearly all products from pharma, to shampoo, to software, to apparel, to food and beverage, to health and beauty, you name it, are subject to theft and counterfeiting. Mitigating product risk through effective traceability is a major driver in the future adoption of ADC and AutoID technology for companies across industries regardless of size in the coming decade. Several states, such as California, are beginning to mandate and regulate product identification and federal agencies are also leaning in that direction. Electronic labeling and documentation will drive more widespread adoption of ADC, even to the home through smart phone and reader capabilities. "There's an app for that."

Despite widespread adoption already, while we see that more than half of the companies are using ADC technology to support material handling transactions, nearly half are also planning to implement them. We believe that this indicates that the technology, as it is maturing and cost is dropping, makes the technology more accessible to a greater number of companies. Combine that with the reasons why companies are adopting ADC technologies in Figure 4 and we can begin to see a picture of growth in applying ADC technology for performance improvement emerging into the mainstream. Companies simply can't "not adopt" the technology to improve data collection speed and accuracy. And, compliance requires even the smallest facility to adopt some level of ADC.

What we find interesting over the years, is that visibility is always at the top of everyone's list of reasons, challenges, and solutions in supply chain management. In this case, the added factor is data accuracy. Visibility in the absence of data accuracy is not particularly useful. The purpose of data accuracy and automated digital data collection to a large extent is to provide visibility to operations performance and the analytics to identify and improve performance where necessary. So it's not surprising to find it at the top of the list. What's surprising is how frequently it's at the top of the list without necessarily accelerating adoption of the technologies to achieve it. It's a major part of why ADC solutions are no longer optional.

Figure 4. Reasons for Automating with Data Collection



That leads to reasons two and three going hand in hand; only a percentage point separates them resulting in a chicken and egg situation. While the survey says productivity improvements are the second most important driver, we believe cost reduction pressures drive productivity improvements. And, if you read much of the research in the industry, supply chains are still driven more by the pressures to reduce costs than any other factor. We could argue that the difference between cost and data accuracy/visibility is not significant enough to trump cost reduction pressure also. What's the answer?

We believe supply chain teams have to focus more on justifying new ADC and other technologies on the lesser respondent factors: profit growth, revenue generation, competitive advantage, and to a lesser extent capacity utilization, improved planning, and lean manufacturing. Cost reduction pressures drive short term behavior without long term improvement. Financial and competitive initiatives drive return on invested capital. Capacity utilization, improved planning and lean manufacturing drive reductions in working capital, productivity improvements, and free cash flow. Leveraging the expertise of your ADC technology provider can provide you with improved solution analysis and financial impact to gain for the proven benefits that technology adoption can provide.

Interestingly enough, there is a significant gap between customer-driven initiatives and supplier-driven initiatives, probably for obvious reasons. We, however, think that you should reverse the rank. There is a treasure chest of opportunity that lies in collaboration and automating process flow between trading partners. Sure, you are going to listen and adapt to what your customer initiatives are; but, you rarely can empower that process. It is customer-driven. On the supplier side, you are the customer. You can drive process automation faster with your suppliers; and, you can use the experience and leverage the technology to provide innovation and value to your customers to generate new revenue and reduce current costs.

ADC Technologies Vary Greatly by Use and Adoption

While companies generally agree on the importance of ADC technology for operations effectiveness, the areas for adopting ADC Technology, the reasons for adopting it, and the use of ADC technology varies greatly across the requirements. We believe that this indicates the growing diversity in the application of ADC technology beyond simply operations effectiveness into new functions across the enterprise. It also represents the diversity of requirements for ADC technology for different industries and functions. And, it represents the requirements for data capture beyond the traditional transactional requirements. For example, more information is required for product identification, description and conditions of the environment such as production date, batch and serialization, composition, temperature control as the product moves through the network, and authentication in the case of products prone to theft and counterfeiting. And, this requirement for additional data is impacting all industries. Figure 5 indicates the current and future usage of ADC technology by the survey respondents.

As one would expect, the pervasiveness of traditional operations automation applications such as WMS, TMS, and Shop Floor have driven adoption and usage. Material handling data collection is a key driver of barcode and in particular 1D linear barcode. The use of rugged mobile computers, fixed mount scanners, and vehicle mount scanners are driven by material handling and shop floor applications. The numbers would seem to indicate that while most companies are using barcodes, their mobile transaction environments require different ADC devices. This would also be supported by the lower adoption of mobile barcode printing, consumer grade devices, pick-to-light, wearable computers, voice technologies and industrial grade tables. Pick-to-light and voice technologies are definitely influenced by the unique requirements of different industries operations environment, such as high volume piece pick. Consumer grade devices and industrial grade tables are emerging technologies and are often being utilized in emerging ADC application functions such as field sales and service, DSD and parcel, and others.

New Applications of ADC Drive Changes to AutoID Requirements and Technology

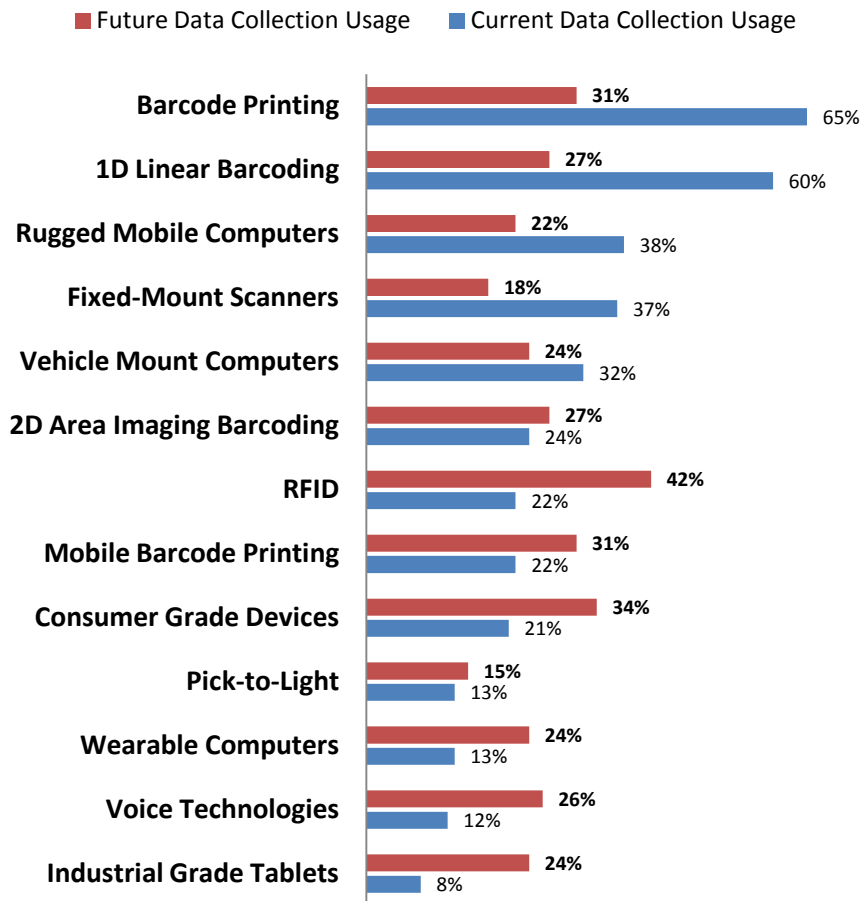
What's interesting is to contrast this with the changes respondents are anticipating in data collection use and adoption as illustrated in Figure 5. Clearly traditional barcoding will continue to be pervasive and most of the companies surveyed plan on implementing barcoding if they have not already. That said, the companies also plan on aggressive implementation of RFID and a moderate increase in the use of 2D area imaging barcoding reflecting, in our opinion, the need to collect more robust data as product moves through the supply chain. The increased use of mobile bar code printing and wearable computers would also indicate the need to add information and interpret information as product moves through various states and conditions in the supply chain.

Another indicator of the combination of more mobile data collection and in process updates, as well as the pervasiveness of ADC in all companies and in other areas of the enterprise, is the planned increases in the use of consumer grade devices, rugged mobile computers, and industrial grade tablets. We would suggest that these are the devices that would be most associated with automation of Field Sales and Field Service processes and personnel indicating increased investment in those functions.

Interestingly, companies are not planning as much future implementation for vehicle mounted computers and fixed-mount scanners. This appears to be an indicator that people are seeking more flexibility and adaptability in their technology investments. Given the shelf life of computing devices and technology today, most vehicles useful lives may span several generations of technology improvements and software enhancements. The fact that 38% of the companies surveyed either have or are planning

use of voice technologies is also an indicator that companies are seeking more flexibility in their ADC solutions.

Figure 5. Change in Data Collection Use and Adoption



As new technologies come available and the price of ADC drops, companies want the flexibility and cost of more options for adoption. RFID is a good example. When it was introduced, adoption was slow based on the cost of “rip and replace” of existing infrastructures and skepticism regarding the cost and ROI of the tags themselves. As the price came down and hybrid infrastructures emerged to enable companies to “gracefully” evolve their infrastructure to accommodate multiple devices and technologies we have begun to see an increase in the rate of adoption. Further accelerating the demand are regulatory and authentication issues and more use cases in support of the benefits and ROI for the new and emerging technologies like RFID and 2D area image bar coding. On the consumer side, use of QR codes is also increasing and scanning apps for consumer grade devices will be accelerating adoption of ADC at the consumer level.

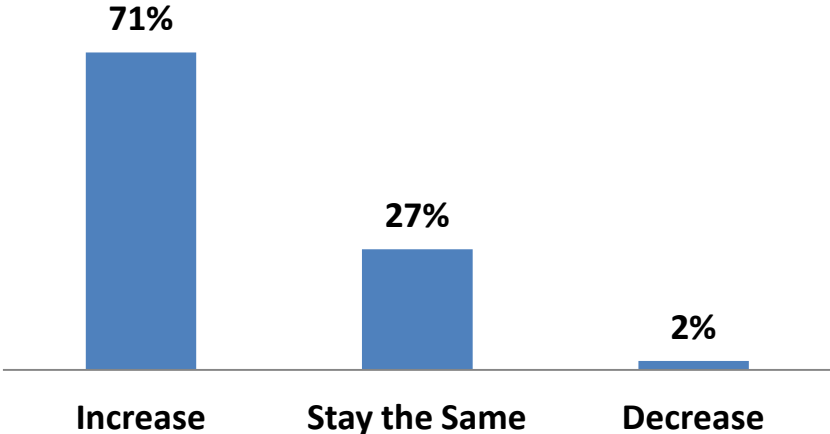
Taking all of this into consideration, companies are facing a proliferation in ADC technology and the requirements are blurring. ADC adoption and usage is expanding beyond traditional warehousing, manufacturing, material handling, and transportation into other area of the enterprise. Companies would be well advised to work closely with ADC providers that have deep solution experience that can

define the specific requirements of each candidate environment for ADC and have the knowledge and depth of experience to ensure specification of equipment that addresses the company’s requirements while considering the flexibility required to adapt to an ever changing technological and functional environment in the future.

Conclusion

While the ADC market has clearly crossed the chasm, it is also an evolving and changing market in the technologies and use cases in implementation. Not wanting to simply assume that we are going to see growth in the market, we asked our respondents how their company’s investments would change in the next few years as in Figure 6. As expected, 71% of the respondents said their investments would increase with only 2% reporting a decrease in spend.

Figure 6. Future Investment in Data Collection



With the technology trends in cloud computing making applications more affordable, we are seeing more Software as a Service offerings emerging for manufacturing, distribution, transportation, customer relationship management, asset management and other functional areas that require mobile transactions and automatic data collection solutions and devices. Enterprise applications are becoming more “data hungry” with business intelligence and decision support technology emerging to analyze and interpret this trend to “Big Data.” The technologies to support ADC across the supply chain beyond simple identification and into product monitoring, sensing, and real time data reporting and collection is evolving and expanding. The cost of ADC solutions and devices are becoming increasingly affordable and the regulatory compliance and risk management requirements are mandating to companies that they must track, trace, and authenticate product everywhere in the supply network.

As the requirements and selection of the right technologies and devices that a company should use to meet their unique industry, functional, and site requirements, it becomes increasingly more important for companies to engage solution partners with deep and broad knowledge and experience in the ADC market. Automated Data Collection solutions are no longer optional. Companies have to ensure that they are implementing the technologies, processes, and devices that will offer the greatest adaptability to the future with the greatest return on investment.

About Supply Chain Services

Supply Chain Services is a leading provider of best-in-class customized data collection, barcode scanning, barcode printing, rugged mobile computing, wireless networking solutions, and software that offer out-of-the-box automation and improvements for the value-chain processes of manufacturing, distribution and warehousing companies. As specialists in the automated identification and data collection (AIDC) industry, we are a single source for evaluating, designing, integrating, implementing, managing, and supporting data collection technology infrastructures that generate very high and very fast return on investment for our customers.

About Motorola Solutions

When it comes to enterprise mobility, Motorola delivers. Our complete array of rugged industrial mobile devices is designed for the rigors of everyday warehouse use, including bar code scanner in addition to handheld, vehicle mount and wearable mobile computers that are capable of voice-directed and text-based applications. Our award-winning next generation wireless LANS are built to manage the unique challenges of mobility, delivering outstanding dependable wireless connectivity as well as high-quality voice – and can meet the needs of the largest enterprise to the small and midsize business. And if you are looking to enable next generation technologies, such as RFID and mesh networking, Motorola is uniquely positioned to transform your enterprise with the broad spectrum of mobile products and technologies to further automate your entire supply chain – and take efficiency and cost-reduction to the next level.



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