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Blockchain Technologies to Create the Next Generation of Digital Supply Chain Networks for MSMEs

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Abstract—*Micro, Small and Medium Enterprises constitute the backbone of an economy in maintaining an appreciable growth rate and in generating employment opportunities. This sector has been regarded as engine of economic growth and social development in many developed and developing countries. Contribution of MSMEs to the Indian economy in terms of employment generation, containing regional disparities, fostering equitable economic growth and enhancing export potential of the country has been quite phenomenal Technology has transformed how we work, play and do business. It has provided new solutions to old problems, disrupted traditional business models and helped us become more efficient. In an increasingly digitized world, emerging technologies, such as Blockchain, afford organizations opportunity to drive business value throughout their supply networks.*

Supply chains across industries and countries will be re-imagined, improved and disrupted by Blockchain technologies. We now have safer and more efficient ways to connect with business partners as well as to track and exchange any type of asset. The ability to deploy Blockchain technologies to create the next generation of digital supply chain networks and platforms will be a key element in business success

Building supply chain capabilities with digital technologies can result in greater levels of performance. Blockchain is an enabling technology, which is most effective when coupled with other next generation technologies such as Internet of Things (IoT), robotic cognitive automation or smart devices.

Despite the multiple challenges, chiefly slow growth and stressed work order, MSMEs should consider going for TQM practices and setting up world-class manufacturing facilities within reasonable outlay. In the days to come, these will be a key differentiator.

Introduction:

For Socio-economic transformation of the country, the MSME sector is extremely crucial in addressing the national objectives of bridging the rural-urban divide, reducing poverty and generating employment to the teeming millions. It is therefore, essential that India adopts a suitable policy frame work that provides the required impetus to seize the opportunities and create an enabling business environment in order to keep the momentum of growth and holistic development. It is equally important that the MSME sector must address the infrastructural deficiencies and is well empowered to meet the emerging challenges for its sustainable growth and survival in a globally competitive order.

Micro, Medium & Small Scale Industry

The Indian MSME sector is the backbone of the national economic structure and has unremittingly acted as the bulwark for the Indian economy, providing it resilience to ward off global economic shocks and adversities. With around 63.4 million units throughout the geographical expanse of the country, MSMEs contribute around 6.11% of the manufacturing GDP and 24.63% of the GDP from service activities as well as 33.4% of India's manufacturing output. They have been able to provide employment to around 120 million persons and contribute around 45% of the overall exports from India. The sector has consistently maintained a growth rate of over 10%. About 20% of the MSMEs are based out of rural areas, which indicate the deployment of significant rural workforce in the MSME sector and is an exhibit to the importance of these enterprises in promoting sustainable and inclusive development as well as generating large scale employment, especially in the rural areas.

Supply chain has widely been identified as the industry supply chain sectors other than financial services where Blockchain will play a major transformative role in the near term. The reason behind this perspective is easy to understand. The supply chain has traditionally been a relatively more chaotic aspect of global trade involving myriad regulations, paperwork and participants who are spread across the world. It is also largely an opaque system with real accounting and accountability happening only at specific pre-decided checkpoints.

Blockchain technology can be used to verify the identities of business partners in supply and value chains internationally or locally. MSME's will benefit from applying blockchain

technology because the technology can be applied to supply chains of any magnitude.

Skills and attributes of employees can be validated and their outputs can be trustlessly tracked through the distributed online ledger of the blockchain network. Blockchain technology can also be used to verify and certify products and services. In fact, the technology is proving helpful in checking supply chains of MSME's, and the backward linkages and the forward linkages. Since blocks are time-stamped, it's easy to track the path of products, their quantity and the time attached.

What constitues MSMEs

- As per MSME Development Act, 2006

Category	Services	Manufacturing
Micro	Upto 10	Upto 25
Small	10-200	25-500
Medium	200-500	500-1000

(All figure in Rupees in lakh)

MSME shipping handicaps:

Imports and exports of goods in MSME's are afflicted by immense paperwork and bureaucracy. The processes greatly reduce the efficiency of the actual business. Blockchain technology will help in checking and balancing MSME processes reducing lead time. MSME's in developing countries will have greater benefit from using blockchain technology as there are larger numbers of small businesses and stricter monitoring facilities.

Smart contracts must be validated by the parties involved. Contractual events can be listed in encrypted blocks which are shared among the authorized parties. The contracts trigger the events involved in MSME processes keeping with due dates and payments.

For MSME's to be efficient, they must perform consistently and on time. Blockchain technology will improve forward and backward linkages of these companies to ultimately multiply the aggregate output.

The Process is to create a significant innovation in traditional record keeping. It has three main features:

- Veracity – multiple copies (as opposed to a single copy) of the complete historical record of ledger entries are each verified by consensus. (Bogus entries are identified and eliminated by failure to reach consensus.)
- Transparency – it is a public record of activity that can be seen by all market participants.
- Disintermediation – it operates using a peer-to-peer network, rather than requiring a specific central organization.

Historically, ledgers have taken two key forms: two-party (or "nostro-vostro"), and centralized. Two-party ledgers are based in traditional double-entry bookkeeping: when processing a transaction, one organization will record a credit and the other a debit. In a centralized ledger, a central authority maintains and appends records to a single ledger, and may choose to show a copy of that ledger to other market participants.

Ledgers have been at the heart of commerce since ancient times and are used to record many things, most commonly assets such as money and property… However, in all this time the only notable innovation has been computerization, which initially was simply a transfer from paper to bytes. Now, for the first time algorithms enable the collaborative creation of digital distributed ledgers with properties and capabilities that go far beyond traditional paper-based ledgers.

On October 31, 2008, *Satoshi Nakamoto* released the Bitcoin White Paper outlining a purely peer to peer electronic cash/digital asset transfer system. This is the first popular implementation of Blockchain and is attributed as birthing today's Blockchain industry. Since then, additional Blockchains have been popularized, Ethereum, various Hyperledger project solutions, as well as numerous others including "Blockchain like" solutions.

What is Blockchain?.

Blockchain technology is a digital innovation that is poised to significantly alter financial markets within the next few years, within a cryptographic ecosystem that has the potential to also significantly impact trusted computing activities and therefore cybersecurity concerns as a whole.

Blockchain is a distributed database that holds records of digital data or events in a way that makes them tamper-resistant. While many users may access, inspect, or add to the data, they can't change or delete it. The original information stays put, leaving a permanent and public information trail, or chain, of transactions

The key differentiator of Blockchain is disintermediation of the ledger – the ability to transact without the need for a trusted third party (like a bank), enabled through the distributed ledger.

Think of it like this: If the entire Blockchain were the history of banking transactions, an individual bank statement would be a single "block" in the chain. Unlike most banking systems, however, there is no single organization that controls these transactions.

In short, Blockchain is a record-keeping mechanism that makes it easier and safer for businesses to work together over the internet.

The Blockchain technology is mainly designed to enable the maintenance of a permission less distributed databases which consists of a growing list of data records that preserves the integrity, singularity and validity of the stored information, without involving any trusted third party for verification

purposes. It has potential to protect the identities of the user that make Blockchain a more secure way to carry out transaction.

Blockchain technologies are rapidly being adopted in the financial services industries, and project supply chain operations to be the next fertile ground for this fast-evolving technology. Blockchain is a distributed, or shared, ledger that holds records of digital transactions in such a way that makes them accessible and visible to multiple participants in a network, while keeping them secure. The digital shared ledger is updated and validated with each transaction, resulting in a secure, permanently recorded exchange. The result is faster, permission and auditable B2B interactions between parties such as buyers, sellers and logistics providers.

Supply Chain Main Points:

Traceability: Capability to monitor events and Meta data associated with a product.

Stakeholder Management: Effective governance in place to enable communication, risk reduction and trust among the involved parties.

Flexibility: The ability to adapt rapidly to events or issues, run various scenarios, without significantly increasing operational costs.

Compliance: Standards and controls to provide evidence those regulatory conditions are met

If Blockchain technology allows us to more securely and transparently track all types of transactions, imagine the possibilities it presents across the supply chain.

Every time a product changes hands, the transaction could be documented, creating a permanent history of a product, from manufacture to sale. This could dramatically reduce time delays, added costs, and human error that plague transactions today.

Some supply chains are already using the technology, and experts suggest Blockchain could become a universal "supply chain operating system" before long. Consider how this technology could improve the following tasks:

Recording of the quantity and transfer of assets: like pallets, trailers, containers, etc. - as they move between supply chain nodes.

Tracking purchase orders, change orders, receipts, shipment notifications, or other trade-related documents.

Assigning or verifying certifications or certain properties of physical products; for example determining if a food product is organic or fair trade

Linking of physical goods is to serial numbers, bar codes, digital tags like RFID, etc.

Sharing information about manufacturing process, assembly, delivery, and maintenance of products with suppliers and vendors

This 'shared version of events' enables improved supply chain efficiencies, better multi-party collaboration, and streamlined resolution processes when exceptions or disputes occur. Although shared visibility solutions exist, they are generally proprietary and therefore not interoperable. By contrast, Blockchain is evolving through open standards initiative. Leveraging Blockchain is not about replacing well-established forms of supply chain interactions, such as EDI, which today deliver proven business value and are integrated into enterprise applications systems such as ERP. Rather, as organizations implement new supply chain technologies, for example Internet of Things (IoT) technologies can for improved logistics processes monitoring, Blockchain will be used provide a synthesized record of information flows. This level of shared visibility will offer organizations an opportunity to optimize multi-party supply chain processes. Finally, as Blockchain evolves and organizations increasingly adopt the technology, Blockchain-based smart contract technology will be deployed to further streamline exception handling and introduce new forms of supply chain process automation.

Food supply chain today: Distributed real-time, Update of information, Input, Providers, Farmers, Aggregators, Wholesalers/Restaurants, Retail

Food supply chain tomorrow: Consumers, Processors, Regulator, Wholesalers/Restaurants, Retail, Consumers, Non-traditional Tech Suppliers, Aggregators, Logistics

Input Providers:

Blockchain: Two chains combine - Supply chain meets Blockchain

The core logic of blockchain, applied to the supply chain

Apply that same security and redundancy to something like inventory, and substitute supply chain partners for banking nodes, and you have the foundation for a radically new approach to supply chain management.

The use cases for this new way of working are compelling. At its most basic level, the core logic of blockchains means that no piece of inventory can exist in the same place twice. Move a product from finished goods to in-transit, and that transaction status will be updated for everyone, everywhere, within minutes, with full traceability back to the point of origin.

Blockchain considerations and challenges:

Today's supply chain challenges and how Blockchain can help Supply chains encompass the end-to end flow of information, products and services, and money. The way these components are managed affects an organization's competitive positioning

in areas such as product cost, working capital requirements, speed-to-market, and service perception. Organizations are exploring innovative methods to streamline their supply chains to meet evolving consumer demands and optimise efficiencies. Technological advances are collapsing linear supply chains into dynamically connected and always-on digital supply networks (DSN), transforming how businesses exchange and share information and assets.

It is critical that organizations conduct a comprehensive review and assessment to ensure they can introduce controls to mitigate and manage the issues associated with Blockchain implementation. Careful evaluation of risks using Deloitte's Blockchain Readiness Framework can set the foundations of a prosperous Blockchain journey. An organization's appetite for the risks associated with Blockchain may be measured across three primary domains: Standard Risk, Value Transfer Risk, and Smart Contract Risk. Additionally, matters such as levels of market adoption and regulatory involvement raise concerns across most nascent technologies. Increased transparency, an inherent capability and the most notable advantage of Blockchain, may cause some businesses to think twice before progressing towards implementation due to concerns about competitive advantage and security. However, the most common concerns, detailed below, may be mitigated by effective planning.

Source visibility:

- Concern: Competitors might be able to view supply chain sourcing details.
- Mitigation: The identities of parties involved in a transaction or movement of goods are hidden.
- Only their public keys are visible to the rest of the network. New public keys can be used for each transaction for added security. Supply chain security
- Concern: Using distributed ledger technology might put supply chains at risk of a cyber-attack.
- Mitigation: Blockchain's underlying capabilities provide data confidentiality, integrity and availability, but as with any other technology, organizations need to have in place robust cyber defense strategies.
- Data ownership:
- Concern: A third party might own the supply chain data.
- Mitigation: Suppliers would need to be incentivized to share data and use the Blockchain in conjunction with their internal local data system.

Transaction volume:

- Concern: Competitors might be able to determine how much merchandise is moving.
- Mitigation: The contents of a tracking record on the Blockchain can be encrypted.

Implementing an emerging technology invariably causes businesses to hesitate. However, thorough evaluation of the aforementioned considerations will likely alleviate the risks associated with a Blockchain implementation. Above all other considerations, creating a Blockchain strategy today will support entities in managing and developing solutions, which can then be shared across the business, remediating existing challenges and creating operational efficiency gains.

Action:

1: Internal Socialization

Begin the discussion now in order to gauge business and IT interest in the potential applicability of Blockchain within your business.

2: Education

Having secured internal buy-in for the potential use of Blockchain, invest in establishing a working knowledge of the technology (what it is, associated benefits, different types, etc.)

3: Ideation

Team with experts to determine the art of the possible for Blockchain as it relates to your business, including the creation of a Blockchain strategy and prioritisation of use cases

4: Use Case Design

Select the targeted use case and define the supporting architecture and Minimum Viable Ecosystem (note that it is often advantageous to start small as it allows for a quick win and demonstration of Blockchain's potential)

5: Implementation

Rapidly progress the prioritized use case through iterative cycles, establishing a go-to-market approach, business case and method to create a commercial-scale product

"One of the key benefits of Blockchain technologies is in the immutability of the data in the chain. If the genesis block was created with trustworthy data, and each additional transaction is validated by network consensus, then in theory the current state of the chain can be trusted…. establishing a high level of data integrity, thereby making data trusted, available, secure, and compliant for everyone connected to the Blockchain network."

Blockchin, or distributed ledger technology, has become well known among some circles because of its relationship to bitcoin. Conceived as a way to record transactions among those involved in a transaction without the use of financial institutions, Blockchain's secure technology has additional applications in the business world. Some organizations have begun investigating Blockchain and considering its uses for their business, but they are still exercising caution as they

weigh the potential benefits of this technology against the barriers to its implementation.

The Technology and its Current Use:

Blockchain technology enables each data element recorded in a ledger to be encrypted in a block. These blocks are chained together across a network accessible to the entities involved in the transactions (these could be suppliers, customers or any other key business partners). A collective agreement on the transactions that take place across the network is reached among the entities through a consensus algorithm. Once a consensus is reached, the data for the transactions cannot be changed and becomes the data of record. The storage of data is across the network, rather than in one place, and the inability to change data make Blockchain a secure way of recording transactions. For the supply chain, this means more consistent records rather than the disputes and corrections that occur for many organizations. This technology also has applications for any tracking that occurs in the supply chain because it enables organizations to maintain accurate and secure data among partners.

Organizations keeping up with technology trends seem to have high hopes for Blockchain and recognize that they could directly benefit from the technology, but they hesitate to commit to making an investment in the near future. Because there is not yet wide use of Blockchain technology, these organizations are waiting to see how others apply it before deciding to invest in it themselves.

Future Use:

Despite the uncertainty around adopting Blockchain in the immediate future, participants in the research recognize a variety of potential applications for Blockchain technology.

Organizations also recognize that adopting Blockchain has its barriers. The most concern among organizations is finding people with the necessary skills to use Blockchain technology. The adoption of Blockchain presents a shift away from how organizations have stored and shared data. Because it has yet to be widely adopted, organizations may struggle to find qualified staff can help them initiate and sustain its use.

Blockchain technology has the potential to change how transactions are recorded. “Blockchain is the most significant innovation in bookkeeping since double-entry accounting was introduced long back”. Distributed ledger technology has the potential to generate benefits through the disintermediation of networks. It can reduce the costs of intermediation (i.e. the need to incentivize a third party to verify transactions) and does not provide a central point of potential failure. The broad implications, including:

- Operational simplification and fraud minimization
- Digital identity
- More transparency in transactions

Whenever there are multiple parties which do business together in a network but don’t quite trust each other (the “trust but verify” approach), Blockchain based solutions could be helpful. It could work for land registries, healthcare records, freedom of information requests, passport and visa control and even tracking international flights, and Global supply chain. The adoption of the technology by industries automatically increases the requirement for Blockchain professionals who have the skill-set to navigate the requisites of the technology. Although Blockchains are distributed, users are given access to edit only those portions of the Blockchain which they own. This restriction makes the technology secure and highly transparent; there’s no need to worry about privacy breach even though the ledger is public. Called the ‘internet of value’, Blockchain allows access of a file anywhere provided the user has the key. Even beyond the financial sector, Blockchain technology is being channeled for business improvement. Start-ups have the biggest demand for Blockchain technology as they will find it easier to establish the technology in the beginning rather than uproot an entire network from existing MSME’s. However, this hassle doesn’t seem to stop full grown businesses from coveting the technology.

Blockchain Technology will help MSME’s; Micro, Small and Medium Enterprises:

Blockchain technology can be used to verify the identities of business partners in supply and value chains internationally or locally. MSME’s will benefit from applying Blockchain technology because the technology can be applied to supply chains of any magnitude.

Skills and attributes of employees can be validated and their outputs can be trustlessly tracked through the distributed online ledger of the Blockchain network. Blockchain technology can also be used to verify and certify products and services. In fact, the technology is proving helpful in checking supply chains of MSME’s, and the backward linkages and the forward linkages. Since blocks are time-stamped, it’s easy to track the path of products, their quantity and the time attached.

MSMEs have been mainly suffering in India from a lack of financing options. The problem is that banks are becoming reluctant to lend money or lend it at high-interest rates due to the risk in delayed payments.

Blockchain will disrupt the complete trade and supply chain finance industry because of reliability and reduced cost it can provide. The benefits of Blockchain for MSMEs include the following:

The most well-known Blockchain application is to send and receive payments. Thus, for MSMEs they are able to transfer funds directly and securely to anyone they want in the world almost instantly and at ultra-low fees. That’s because there aren’t any intermediaries slowing down the transfer of funds between several banks and charging outrageous transaction fees.

Blockchain transactions are known as "smart contracts." Which are the automated computer protocols that facilitate, verify, and enforce the negotiation and performance of a contract on the Blockchain. They provide a safe and secure way to negotiate, including less fraud and more security, lower transaction costs, faster transaction execution, and no middleman.

Blockchain technologies make tracking and managing digital identities secure and efficient, resulting in seamless sign-on and reduced fraud. Blockchain allows a more effective and reliable form of identification of a person without the requirement for third party involvement. This can help MSMEs speed up processes and make them more reliable.

MSME shipping handicaps:

Imports and exports of goods in MSME's are afflicted by immense paperwork and bureaucracy. The processes greatly reduce the efficiency of the actual business. Blockchain technology will help in checking and balancing MSME processes reducing lead time. MSME's in developing countries will have greater benefit from using Blockchain technology as there are larger numbers of small businesses and stricter monitoring facilities.

Storage of assets:

Digital assets as well as intellectual property can be protected using Blockchain technology. Using the secure Blockchain platform, possibilities of theft and fraud will be minimized.

Smart Contracts for MSME processes:

Smart contracts will be validated by the parties involved. Contractual events can be listed in encrypted blocks which are shared among the authorized parties. The contracts trigger the events involved in MSME processes keeping with due dates and payments. For MSME's to be efficient, they will perform consistently and on time. Blockchain technology will improve forward and backward linkages of these MSME's, to ultimately multiply the aggregate output.

To validate potential applications for Blockchain technology and assess expectable future developments, the current phase of Blockchain needs to be determined first. Based on this assessment one can investigate which of the challenges MSME's have during the implementation of Blockchain solutions are typical for the development phase and in addition expected developments can be forecasted. The impact of Blockchain will firstly change internal business processes and not immediately challenge whole industry supply chain concepts, the role of established firms could change within their market. The opportunity that Blockchain will provide to MSMEs can simply not be ignored. From streamlining contracts, to supply chain and trade financing, or to getting access to alternative financing, Blockchain will allow MSMEs to compete in ways never seen before. There's no waiting around for third-party entities to provide relevant information, which also means processing fees are significantly reduced. As a decentralized ledger, Blockchain technology provides a significant benefit for small businesses by means of more efficient transactions.

In the coming future, we may see the following uses of Blockchain to further MSME growth:

New financing business models will emerge based on trust networks. If we begin to transact based on the verification of assets and people on the Blockchain, businesses can obtain financing with terms that meet their needs, rather than based on the supplier's terms, and from new sources as well.

Use of smart contracts will give micro and small businesses quicker and more efficient access to finance and raw materials. Smart contracts are tiny computer programs that can live on the Blockchain. These programs get stored, verified and executed by the same Blockchain network. This allows for more advanced functions to take place on the Blockchain, such as verifying that an individual meets certain criteria or that multiple parties have complied with an agreement or contract.

Recording, tracking and verifying trades of virtually any asset will be more secure and less costly, thus it will open new forms of financing for MSMEs that were not possible before.

Movable property registries can live on the Blockchain, against which finance can be accessed. Many countries lack comprehensive collateral registries, and collateral is often used to secure working capital and term loans. If the Blockchain were to have a registry of things like accounts receivable, inventory, machinery, equipment and/or real estate, it could be utilized by MSMEs for financing growth.

The distributed economy will not happen overnight. It will require a significant increase in internet access, standards across the nascent industry, more efficient uses of energy, and most importantly, acceptance. It will require governments to embrace transparency and decentralization, and for banks to rethink their role in society. In theory, Blockchain will reduce the need for existing intermediary institutions – government and banks being some of those – but in practice, the largest intermediaries are beginning to explore their use of Blockchain within this future, distributed economic paradigm.

Besides, as there are no intermediaries or central authorities within the Blockchain model, there are no third parties to pay high fees for transactions. Therefore, Blockchain transaction costs are typically little to none. Most cases in which Blockchain network participants do pay fees are when priority verification is crucial. Still, even in such cases, transaction costs are low.

Spend analysis:

Spend analysis used in strategic sourcing, needs a shift from the traditional descriptive analytics model to more predictive and prescriptive analytics. Organizations can develop tools to

enhance their spend analysis with public domain data - from social media, weather data, demographics, suppliers, competition and logistics to name a few - to help uncover insights that can save money and improve supply chain. The key is to recognize the need to reinvent the objectives of spend analysis and fish for insights for better outcomes.

Supplier lifecycle management:

The traditional supplier lifecycle management platform, when augmented by big data from the public domain, can offer meaningful information on suppliers and supply chain risks. For example, monitoring the social media trends on financial stability of the suppliers can help identify supplier risk. This information can also be used for negotiating better deals with the suppliers or as an input to supplier evaluations which eventually enable smarter outcomes. An IoT solution can be employed to track the quality of the product at various stages of the supply chain thus improving the efficiency in the process and providing the metrics for supplier evaluation.

Strategic sourcing:

Sourcing is a fairly complex business process with stakeholders from cross-functional teams. Supplier bids are collected using online sourcing events, but a large part of the sourcing evaluation and award process is manual in nature. Using blockchain for through all steps of the process - proposals, quotes and bids - or auction, can offer greater efficiency and transparency. The adoption of new technology, tools or techniques should be evaluated based on the savings opportunities and sourcing complexity.

Contract management:

Inefficient contracting can cause inadvertent losses to business, and some of the biggest challenges in contracting is to track compliance and obligations. A blockchain platform and its smart contract framework coupled with IoT and AI, can help facilitate greater efficiency in compliance and obligation management. Blockchains are immutable and therefore it may be possible to eliminate the need for electronic signature in near future.

E-Commerce and online stores:

A blockchain-powered solution can provide a robust platform for suppliers and buyers to collaborate and manage an online store. The smart contracts can be enabled to validate all the rules required for business compliance, regulatory compliance, obligation management and more. The supplier ratings and reviews from an e-Commerce site can be integrated with supplier evaluations and risk. The e-Commerce platform can potentially evolve as a self-managed platform allowing the suppliers to add their products online and buyers to transact on this platform within the constraints defined in the smart contract framework.

Order management:

The traditional order management system is internal to any organization and facilitates the fulfillment process. Blockchain platform powered with AI and IoT can drive greater efficiency in orchestrating and streamlining purchase orders, shipment details, trade documents, goods receipts, quality assurance documents, returns and accounting. This exchange-to-exchange orchestration is very promising, and advanced analytics can help facilitate visibility across the entire supply chain ecosystem sending alerts whenever there is a disruption.

Logistics:

The logistics industry is an early adopter of AI, IoT and Blockchain, and is already reaping great business benefits. IoT in the logistics ecosystem can provide great insights on inventory management, shelf life, storage temperature, delivery routes, real-time tracking of freight and more. Procurement practices will never be the same and supply chain operations will transform in ways we never imagined. Adopting these new technologies and practices is the new normal and early adopter stand to gain in the market place.

Suggestions:

Transforming the manufacturing industry through built trust:

Blockchain could be the next great disruption that manufacturers need to truly revolutionize their industry. With the potential to reduce cost by multiples, decrease lead time to focus on other core competencies and other great benefits, the application of blockchain will enable manufacturers to generate greater visibility within their manufacturing process and simplify otherwise mundane.

Enterprise-ready blockchain brings transparency to supply chains:

There are over 17 million shipping containers in the world, of which five to six million are currently being transported on oceans, rails and roads. In the shipping process, inconsistent information and limited transparency across organizational boundaries can sometimes hinder the efficient movement of goods. These costly inefficiencies could soon be eliminated by blockchain supply.

Conclusions:

This paper focused on Blockchain applications in the manufacturing industry supply chain and discloses potentials and challenges. Future research opportunities lie in a deeper analysis of the business processes in the manufacturing to further exploit the advantages of the Blockchain technology for efficient and effective supply chain.

It is impossible to predict whether the Blockchain will work for small businesses in the same way they currently work for large corporations. However, the Blockchain opens massive

potential, applications, and solutions which will make business partnerships as well as financial and agreement settlements easier, better, and safer supply chain.

If the government comes up with higher quality standards that all MSME's have to enforce, then everybody will have to incur the cost of quality. This will level the field of competition for all MSME's. The overall quality standards are expected to improve over time, and MSME's in eastern India will need to develop the capabilities to manufacture products that are of world-class quality. Good quality management practices and the right enablement of technology will help them do so. MSMe's in eastern India have improvement opportunities in both these areas. They should explore the potential of digital technology in the customer interaction and quality management space. MSME's can opt for CRM, partner relationship management (PRM), marketing automation tools, online transactions and mobile presence. Depending on the nature of business, they can find value in one or more of these areas. With regard to quality management practices, the survey found that a few large companies are way ahead of the others. The other MSME's should set the bar high and enhance their existing practices. MSME's needs long were focusing on the Lean and 'just-in-time' methodologies to improve productivity. In addition, they need to have focus on using state-of-the-art production technology and a trained workforce. Another factor that will boost productivity of MSME's is the digitalization of the value chain with MSME's in eastern India starting to take this path. Digitalization and integration will help to connect machines, people and products through the Internet and provides an integrated view on whether any resource can be better utilized in the production line. This can help managers of MSME's can identify whether everything is running as per plan. If not, they can take corrective action immediately. A continuous set of activities that will evaluate new technologies with respect to their Supply chain effectiveness is expected, followed by the adoption of the most suitable technology to improve Supply chain of MSME's. In order to take full advantage of digitalization and integration, it is critical to develop data analysis capabilities. When cyber-physical systems are connected through the Internet, a high volume and variety of data is generated. A wealth of meaningful insights and tangible benefits can be derived by storing this data and performing appropriate analysis. Appropriate strategies should be evolved for creation of an enabling ecosystem for MSME's where these enterprises are able to access the benefits meant for them under a formal and friendly ecosystem and are further capable of meeting the emerging challenges of a globally competitive order.

Policy Intervention and Support Mechanisms: Industry-friendly policies should be initiated by the government for promoting infrastructural support like Blockchain technologies for Supply Chain facilities and for easy availability of finance by the scheduled banks. Government and Banks should take steps for revival of sick units as per RBI Guidelines and Credit Guarantee Fund Trust for Micro and Small Enterprises Scheme.

The blockchain is currently changing the whole market landscape affecting every player in the market. This also includes small and medium enterprises (SME's). In General, SME's take more time to adopt new technologies when compared to the big players. Blockchain does pose the same fate. However, the impact of blockchain on SME's just cannot be ignored.

To the uninitiated, blockchain will open new venues for MSME's. Now, they can improve their money payments and transfers. It will be more secure. Not only that blockchain will remove the need for middleman saving a lot of resources for the business.

Financial transactions can also be automated entirely. MSME's can also use the blockchain to improve the security of their data and critical processes. As blockchain is altogether decentralized, it becomes hard for the hackers to get into the system.

MSME's can improve their supply chain management with the use of blockchain. They will not only lead to the removal of middle-man but also automation. Smart contracts can easily handle tasks such as inventory management, order management, etc..

Blockchains will also enable MSME's to reach the global audience easily. Banks will also have no say in business blockchain implementation. Loaning becomes easier which can allow more growth opportunities for MSME's.

Lastly, both MSME's and customers will benefit from it. The adoption rate, however, will be slow due to blockchain implementation complexity.

Blockchain technology is as versatile as it is powerful. Use cases for blockchains are continually growing in number, but they're already excellent for recording data, transferring value between individuals, digitizing assets, and automating contractual agreements.

Depending on how large an enterprise is, optimizing processes like these or implementing them for the first time could achieve considerable savings, considerable profits, or both. Many small or medium enterprises can benefit immensely from blockchain technology.

Many MSMEs suffer from poor financial record-keeping, an area that blockchain technology is especially well-suited to improve. Blockchains are also known as "immutable ledgers," meaning that they are lists of transactions that cannot be changed or tampered with.

MSMEs that implement blockchain technology for the purpose of record-keeping may be able to significantly reduce their expenditures on record-keeping while seeing huge improvements in the quality of their records at the same time.

Blockchain technology is still in its earliest stages. At the moment, it's impossible to gauge just how far-reaching and expedient its influence will be. One thing seems to be relatively certain, however. Blockchain technology is indeed revolutionary. In the same way that the MSMEs that built their websites benefited the greatest, the MSMEs that adopt blockchain technology will reap the greatest rewards.

Blockchain offers MSMEs a chance to innovate ahead of large business. Clearly MSMEs can use the enterprise resource planning tools brought about by other blockchain companies, but the real impact here is a new avenue of growth.

There is a once in a lifetime opportunity for MSMEs to add a blockchain product to their repertoire, or come up with a brand new business line that will attract capital not available in the past decade. Moreover, it offers SMEs the opportunity to do what they do best: innovate and be nimble.

- Blockchain is a shared, replicated ledger technology
- Delgence supports an open standards, open source, open governance Blockchain
- Blockchain can open up business networks by taking out cost, improving efficiencies and increase accessibility
- Blockchain addresses an exciting and topical set of business challenges, which cross every industry
- Blockchain base ERP project developing open source, open standards shared ledger technology and get started NOW.

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