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BLOCKCHAIN 2.0 SUMMIT

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Topic Name: Supply Chain Management Disruption
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WHAT IS A SUPPLY CHAIN?

The system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer is called “supply chain”.

EACH AND EVERY STEP MUST BE ACCOUNTED FOR

LET'S LOOK AT A HYPOTHETICAL SUPPLY CHAIN

- NATURAL RESOURCES: Is a natural resource like water needed for your product?
- MATERIALS: Do you need to create or procure a material for your product?
- INGREDIENTS: By combining the natural resources and materials you create the ingredients of your product
- FINISHED GOODS: You put together all the resources to create your product.
- RETAIL: Your product gets listed on the shop or in an ecommerce website
- CUSTOMERS: The customer buys the product
- REFUND: If they don't like it, then they get a refund.

BUT WAIT…

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There are two more parts of our supply chain above which we have not mentioned yet:

- Distribution and Fulfillment
- Transportation and Warehousing

The reason why we haven't included these above is because both of them occur at multiple levels throughout the supply chain.

DISTRIBUTION AND FULFILLMENT

What is the core difference between an end customer/user and a customer?

In the context of the supply chain. The end user is the person for who you have built that product or service

However, if you really think about it, throughout our supply chain we have several supplier-customer interactions. This kind of interactions will happen in multiple levels throughout the supply chain.

TRANSPORTATION AND WAREHOUSING

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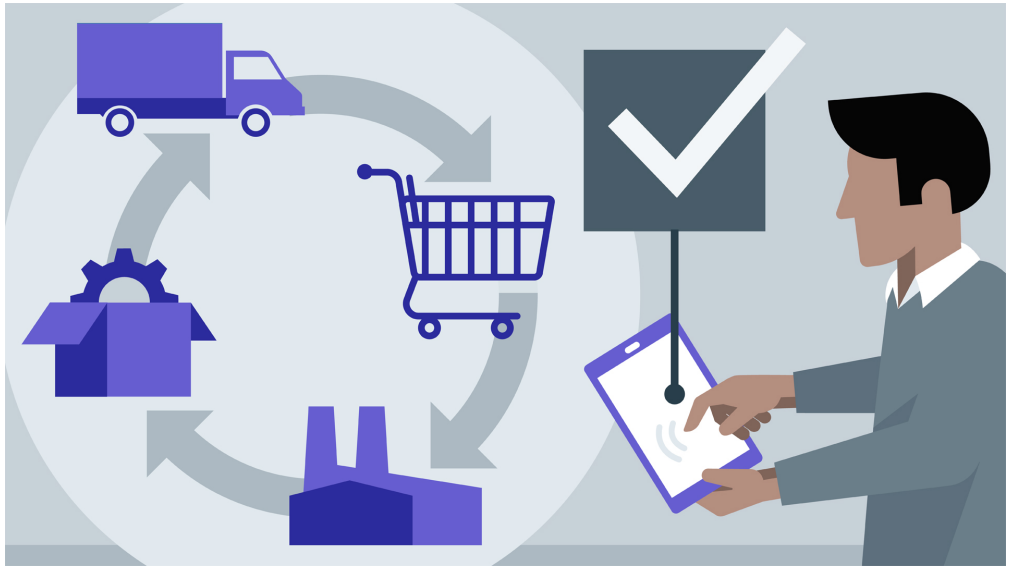
Transportation and warehousing will help in the process of getting resources, materials, ingredients, parts, components and finished goods to the right place at the right time to keep the supply chain operating efficiently.

So, that's what our dummy supply chain looks like. An actual supply chain can be a lot more complicated than this with multiple levels of interactions. Something is needed to carefully plan out and oversee all the steps. This is where supply chain management comes in.

WHAT IS SUPPLY CHAIN MANAGEMENT?



Supply chain management includes integrated planning as well as the execution of different processes within the supply chain. These processes include:

- Material flow
- Information flow
- Financial capital flow

The management of the flow of goods, services, and information involving the storage and movement of raw materials, building products as well as full-fledged finished goods from one point to another is known as “supply chain management”.

WHY DO WE NEED SUPPLY CHAIN MANAGEMENT?

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If you properly implement supply chain management, then you will:

- Increase sales
- Decrease frauds and overhead costs
- Improve the quality of improvisation
- Lead to accelerating production and distribution
- Reduce the cost and complexity of the manufacturing process, especially when the process itself is extremely complex.

Now, all this is well and good, however, as the manufacturing process becomes more complex, the supply chain invariably becomes extremely convoluted and inefficient.

BUT….SUPPLY CHAIN MANAGEMENT IS BROKEN

Problem #1: Hard to Track Down

As a consumer, you don't really know the true value of the products that you are using.

Plus, the lack of transparency in modern supply chains is another major issue. If you have a defective component in your phone, then it is near impossible to pinpoint exactly where that defective piece came from and who was the person(s) responsible for it.

On October 6, 2006, multiple states in the US suffered a major E-Coli outbreak. The culprit? Spinach — Around 199 people were affected of whom 22 were children under 5 years old. 31 of the 199 developed a type of kidney failure called hemolytic-uremic syndrome and 3 people died.

It took the Food and Drug Administration (FDA) a total of 2 weeks to find the source of the contaminated spinach.

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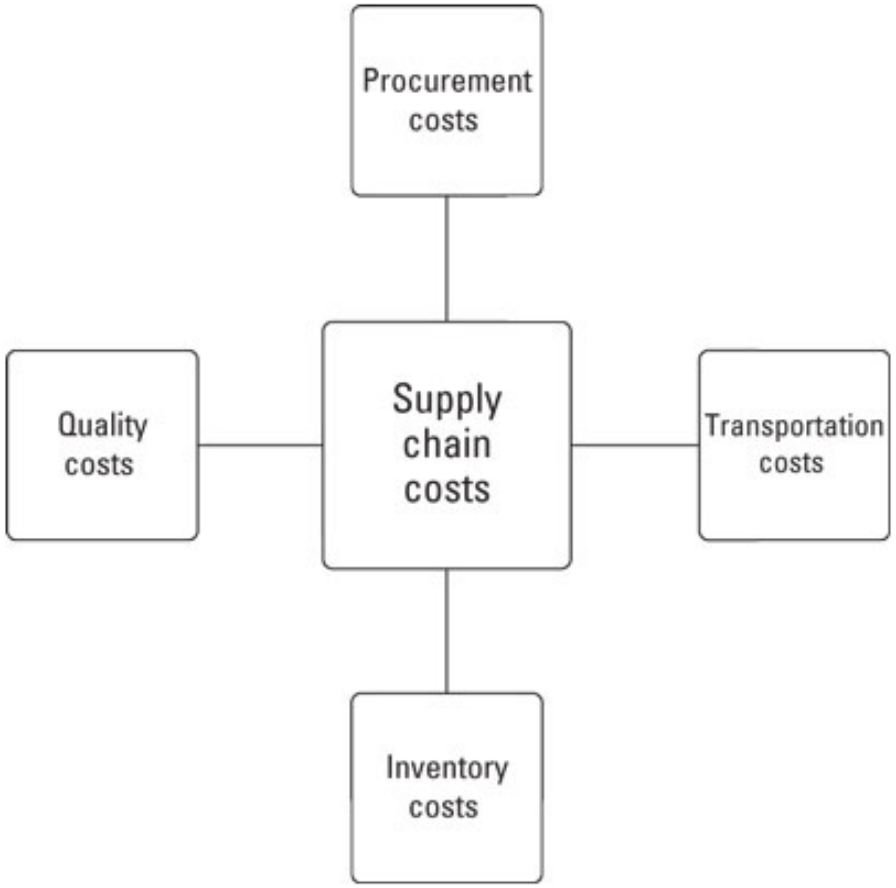
It was one supplier. One farm. One lot.

Problem #2: Corruption

The problem with running a complex supply chain is that you will need to trust all the participants to do their job.

You need to trust them to deliver quality while following standard safety standards. However, human beings are not really that trustworthy and are prone to corruption.

Problem #3: Costs



Supply chain cost drivers.

There are four main factors that shoot up the cost in traditional supply chains:

- Procurement Costs
- Transportation Costs
- Inventory Costs
- Quality Costs

Problem #4: Globalization

Globalization is the process by which your company becomes big enough to have international influence or it starts operating on an international scale. As you can guess, globalization opens up several challenges to supply chain management.

Many companies need to run their supply chain through multiple countries to procure different parts of their products. However, this brings in a lot of overcomplications. Keep in mind that your suppliers are in vastly different geographic locations which makes it really hard to co-ordinate and collaborate. In other words, it is really hard to know whether they are actually doing their jobs or not.

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So, there are two things that we have learnt so far:

- Supply chains are absolutely critical for the overall well-being of your business.
- The current system of supply chains is outdated and requires a significant reboot.

This is where the blockchain comes in.

ENTER THE BLOCKCHAIN

A blockchain is, in the simplest of terms, a time-stamped series of immutable record of data that is managed by a cluster of computers not owned by any single entity.

Each of these blocks of data (i.e. block) are secured and bound to each other using cryptographic principles (i.e. chain).

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THREE PILLARS OF BLOCKCHAIN TECHNOLOGY

The 3 properties of the blockchain technology that is going to help disrupt the supply chain management system are:

- Decentralization
- Immutable
- Transparency

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#1 DECENTRALIZATION

The idea of decentralization is at the very core of blockchain technology. What it basically means is that any data that is stored inside the blockchain is not owned by one centralized entity but shared by everyone who is part of that blockchain's network.

The problem with the current supply chain industry is that all the suppliers and procurement officers inadvertently become their own silos of information. There is nothing that is going to tell us with 100% assurance that the information that these people are sending is 100% authentic or not.

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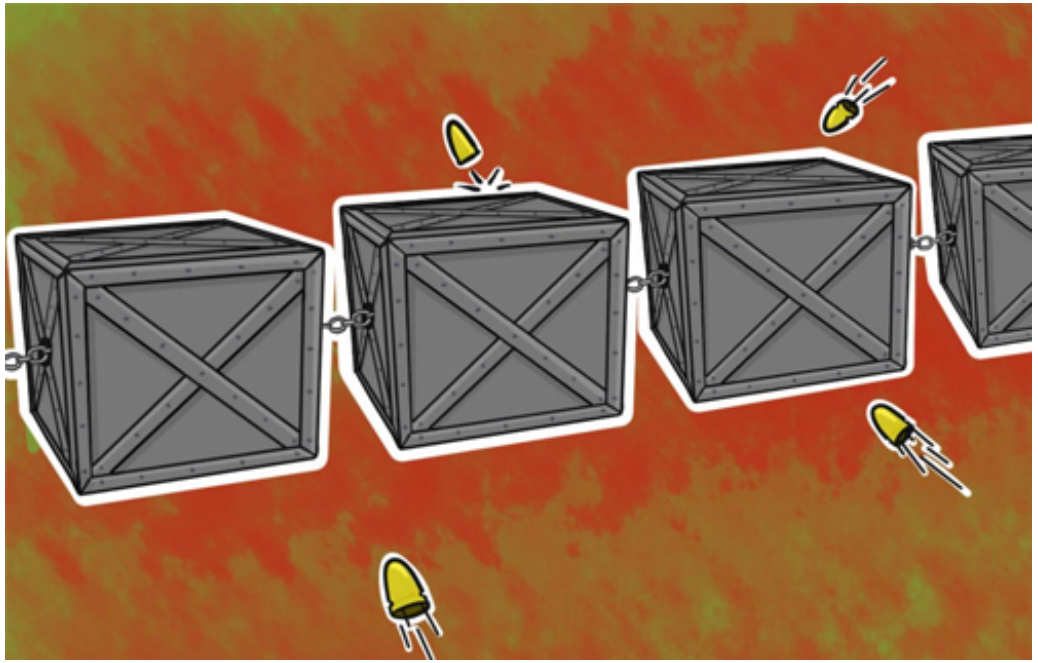
However, the blockchain breaks down this very concept of silos….

When all these different entities, all over the world are connected by this chain, there is no longer any question of data isolation.

All the data that would have stored in them is not being shared by everyone on the blockchain.

#2 IMMUTABILITY



Immutability basically means non-tamperable. Any data that you put inside the blockchain cannot be tampered with.

Can you imagine how valuable this will be for supply chain management?

It is impossible for anyone to tamper the financial records and to justify extra payments once they have entered the data inside the blockchain.

THIS HAPPENS BECAUSE OF CRYPTOGRAPHIC HASH FUNCTIONS

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INPUT	HASH
Hi	3639EFCD08ABB273B1619E82E78C29A7DF02C1051B1820E99FC395DCAA3326B8
Welcome to blockgeeks. Glad to have you here.	53A53FC9E2A03F9B6E66D84BA701574CD9CF5F01FB498C41731881BCDC68A7C8

In simple terms, hashing means taking an input string of any length and giving out an output of a fixed length.

In the context of cryptocurrencies like bitcoin, the transactions are taken as an input and run through a hashing algorithm (bitcoin uses SHA-256) which gives an output of a fixed length.

Let's see how the hashing process works.

We are going to put in certain inputs. For this exercise, we are going to use the SHA-256 (Secure Hashing Algorithm 256).

HOW HASHING HELPS IN IMMUTABILITY

INPUT	HASH
This is a test	C7BE1ED902FB8DD4D48997C6452F5D7E509FBCDBE2808B16BCF4EDCE4C07D14E
this is a test	2E99758548972A8E8822AD47FA1017FF72F06F3FF6A016851F45C398732BC50C

There are certain properties that a cryptographic hash function needs to have in order to be considered secure.

You can read about those in detail in our guide on hashing.

There is just one property that we want you to focus on today. It is called the “Avalanche Effect.”

What does that mean?

Even if you make a small change in your input, the changes that will be reflected in the hash will be huge.

#3 TRANSPARENCY

TxHash	Block	Age	From		To	Value	[TxFee]
0x2d055e4585ae2a...	5629306	16 secs ago	0x003e3655090890...		0x2bdc9191de5c1b...	0,004741591554641 Ether	0.000294
0xb4d37c791ff4cde...	5629306	16 secs ago	0x6c3b4fa1413e0e4...		0xf14cb3acac7b230...	0,744767225 Ether	0.000294
0x9979410dcb5f4c...	5629306	16 secs ago	0x98bcd75abbac05...		0x2d42ee8639bc58...	0,016294 Ether	0.000294
0x189c4d4aae09be...	5629306	16 secs ago	0x175cd602b2a1e7...		0xd39681bb0586fb...	0,01 Ether	0.000294
0xda0e8bbb11fb77...	5629306	16 secs ago	0x73a065367d11c...		0x01986786f14357...	0 Ether	0.00150007
0x6be498fafad9acb...	5629306	16 secs ago	0xa3eb206871124a...		0x8a91cac422e55e...	0,029594 Ether	0.000294

One of the most interesting and misunderstood concepts in the blockchain technology is “transparency.”

Some people say that blockchain gives you privacy while some say that it is transparent. Why do you think that happens?

If you were to look up a person’s transaction history, you will not see “Bob sent 1 BTC” instead you will see

“1MF1bhsFLkBzzz9vpFYEmvwT2TbyCt7NZJ sent 1 BTC”.

So, while the person's real identity is secure, you will still see all the transactions that were done by their public address.

This level of transparency has never existed before within a financial system. It adds that extra, and much needed, level of accountability which is required by some of these biggest institutions.

Speaking purely from the point of view of cryptocurrency, if you know the public address of one of these big companies, you can simply pop it in an explorer and look at all the transactions that they have engaged in.

This forces them to be honest, something that they have never had to deal with before.

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USE THIS IN THE CONTEXT OF SUPPLY CHAIN MANAGEMENT

Every single operation that will ever take place in your supply chain will be recorded in the blockchain for everyone to see.

Can you imagine what this level of transparency can do to your business?

Everyone will be forced to be accountable for their actions

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BLOCKCHAIN TECHNOLOGY DISRUPTS SUPPLY CHAIN

So, from what we have known so far, the blockchain technology has properties of decentralization, transparency, and immutability. As such, it is the perfect tool to use for the disruption of the supply chain management industry.

Every time a product changes hands, the transaction could be documented in the blockchain, creating a permanent history of a product, from manufacture to sale. What this does, is that it reduces:

- Time Delays
- Human Error
- Added Costs

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WHAT PROPERTIES CAN THE BLOCKCHAIN IMPROVE?

- Recording the quantity of the products and its transfer through different parties.
- Tracking all the purchase orders, change orders, receipts, trade-related details
- Verifying the validity of the certification of the products. Eg. this can be used to track whether a particular item meets certain quality standards or not
- It can link various physical items to serial numbers, barcodes, and tags like RFID etc.
- Helps in the sharing all the information about the manufacturing process, assembly, delivery, and maintenance of products with the different parties in the supply chain.

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BENEFITS THAT THE BLOCKCHAIN CAN BRING IN

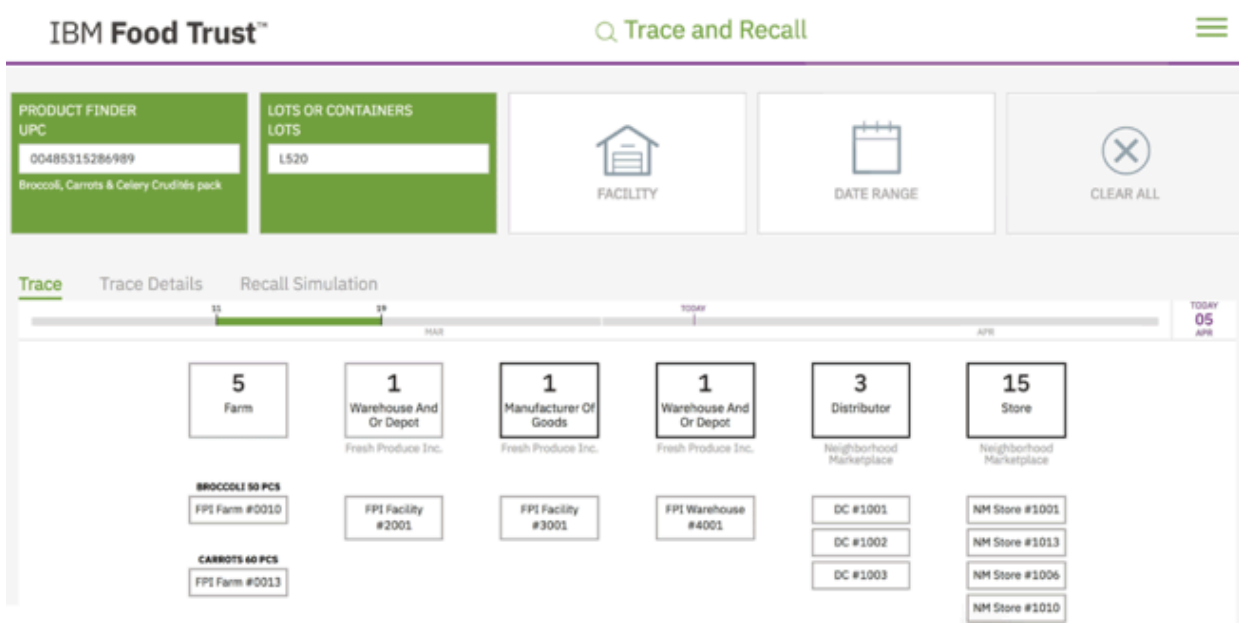
- Blockchain's transparency helps in the careful documentation of a product's journey from its point of origin to all its suppliers. This increases the trust among the various parties in the supply chain because all the data is visible for everyone to see.

- The blockchain network can take in any and all participants of the supply chain network. Plus, regardless of their geographical location, everybody will be able to connect with the blockchain.

- Blockchain's immutability will make sure that all the records in the chain are honest and free from corruption. Plus, the strong security from its innate cryptography will eliminate unnecessary audits, saving copious amounts of time and money.

- The utilization of blockchain also opens up the doors to future innovation

USE CASE: THE FOOD INDUSTRY



Remember how we said that the E-Coli virus brought the spinach industry to a standstill?

Well, turns out that the food industry is actually using the blockchain to build better supply chains to prevent that fiasco from ever happening again!

Many big companies like Walmart are teaming up with IBM to incorporate their “Food Trust System” blockchain in their supply management system.

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HOW BLOCKCHAIN IMPROVED THE FOOD SUPPLY CHAIN

As the blockchain gets integrated into the food industry it will make the whole process more transparent and safer. The advantages of a transparent food system are manifold:

- Greatly enhances food safety.
- Ensures fresher food since no one will risk sending “non-fresh” food in an open system.
- There is less food waste because every single piece of food is accounted for.
- Stops food fraud because the system is open for everyone to see.
- Promotes responsibility among the food producers since they now know that they can’t get away with underhand dealings.
- Gives the customer trust-able information about their food and empowers them to make better buying choices.

CONCLUSION

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The Blockchain Technology and Supply Chain were absolutely made for each other.

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Thank You!