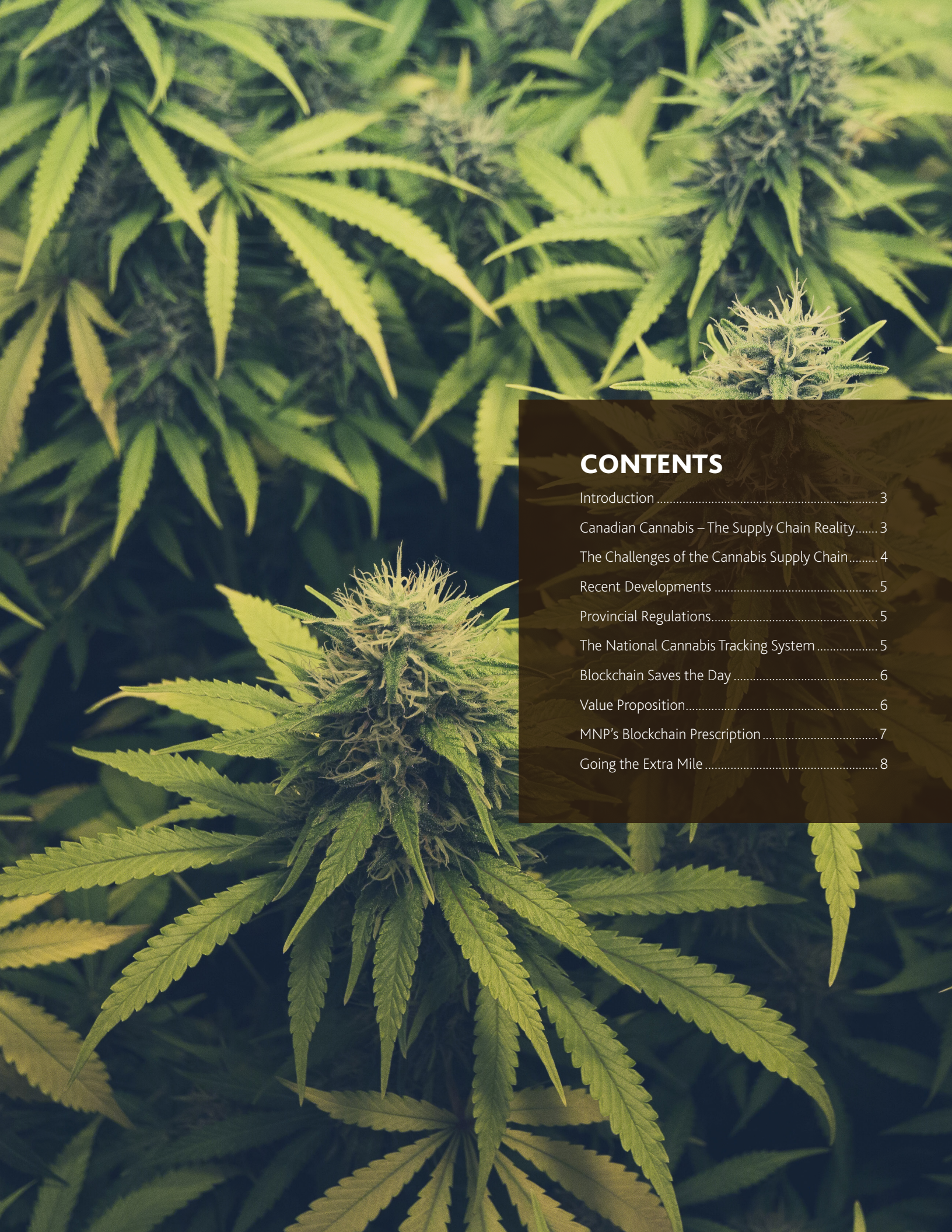


Blockchain in the Cannabis Sector



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INTRODUCTION

2019 is poised to be a ground-breaking year for the Canadian cannabis industry. Despite the excitement, exposure to compliance and supply chain risk continues to rise. In a sector rife with legal grey areas, ensuring regulatory compliance while controlling short- and long-term supply is proving to be a major limiting factor for potential growth. To fight the inefficiencies existing in the current logistics model, organizations from across the cannabis industry are looking for better tools to manage their supply chain networks. In this search, blockchain technology has proven to be both a desirable and feasible solution.



CANADIAN CANNABIS – THE SUPPLY CHAIN REALITY

On October 17, 2018, Canada became the first G7 country to legalize the use of recreational cannabis. Both online, and in stores nation-wide, the demand for cannabis was high. As consumers rushed to licensed retailers to buy cannabis products, they were confronted with a variety of issues. Official cannabis retailers experienced wide-spread product shortages, shipment delays and product quality issues. The result was lost sales in the first few weeks of legalization, with Statistics Canada reporting nationwide sales in October 2018 to be only \$43 million. This represents a first-round loss for the legal cannabis market in the fight to gain sales from illicit sources. Services levels play a key role in dictating widespread utilization of legal channels.

Pricing and availability are cited as primary factors in consumer behavior when switching from illegal to legal markets. Until the supply chain issues are resolved, an increase in sales is unlikely. The responsibility for oversight and management of the cannabis supply chain is a shared responsibility between federal, provincial, territorial, industry, consumer and other stakeholders. Ensuring the establishment and maintenance of accurate inventory data along with maintaining chain-of-custody records requires innovative technological solutions. Early issues were predictable but high order volume is not the only challenge facing this supply chain.

Securing consumer safety and managing the transition to a legal market structure is a unique challenge at this scale. If the cannabis industry is to succeed long term, chain-of-custody issues must be resolved in a transparent manner. Canada has stringent standards for the commercial cannabis program, requiring licensed producers to implement standard operating procedures, strong manufacturing processes and rigorous quality assurance and control. Beyond these standards, effective seed-to-sale tracking software is necessary for the industry to be safe, transparent and accessible.

THE CHALLENGES OF THE CANNABIS SUPPLY CHAIN

Long-term success for the cannabis industry in Canada depends on whether it can implement a successful supply chain system to address all the existing issues.

- **Illegal Market Participants:** The legalization of cannabis does not eliminate the black market. Consumer surveys have revealed many consumers are not switching to legal channels.
- **Unclear Forecasts:** There is no precedent for a country the size of Canada legalizing recreational cannabis. As the legalization date approached, projections for the Canadian cannabis market came to a consensus, with financial forecasts ranging between \$4 billion and \$9 billion a year.
- **Contrasting Regulation:** Seed-to-sale tracking is mandatory and each province has different requirements and a different system of record. Like alcohol and tobacco, inter-province legislative differences add complexity when moving product across borders.
- **Close Integration:** Systems to manage the product from seed to sale require the participation of all industry players. Clear and timely information sharing across platforms and organizations is required beyond even the high standards in the alcohol and tobacco industries.
- **Supply Fragmentation:** For licensed producers (LPs), small- and medium-sized growers may have unpredictable supply strategies that complicate planning and erode profit margins.
- **Stock Keeping Unit (SKU) Diversification:** Cannabis is primed for an explosion of product SKUs across several diverse categories, ranging from infused candles, beer and extracts to equipment for growing personal plants

Cannabis has a federally-regulated production system and provincially-regulated retail system, with varying levels of private enterprise involvement.



Licensed Producers

Unique cannabis seedlings are recorded in a federal manifest. (NCTS)



Distribution and Warehousing

Production and sales data are reported to a variety of regulators.



Retail Stores and Online Sales

To trace a product, direct contact with the retailers and producers is needed.

RECENT DEVELOPMENTS

In an effort to secure consumer safety and exert regulatory control, stakeholders are developing a range of systems and processes.

Provincial Regulations

Provinces continue to enact and amend restrictions and regulations regarding the sale, distribution and use of cannabis. While this process is underway, under or overproduction could hurt profit margins. Investor confidence may be tested if the supply balance is not strategically aligned.

Federal Licenses

All cultivators, processors and sellers are required to hold a license issued by Health Canada under the Cannabis Regulations. Not all licenses issued by Health Canada permit the same activities. Certain licenses only authorize cultivation or production, without the right to sell cannabis products until Health Canada issues a license amendment. Other licenses only permit the cultivation and / or sale of dried flower, whereas some permit the production and/or sale of cannabis oils.

The National Cannabis Tracking System

Operated by Health Canada, the National Cannabis Tracking System (NCTS) was launched on October 17, 2018. To meet regulatory requirements under the Cannabis Act, the objective of the NCTS is to compel the provision of information (including cannabis production, inventories, distribution and sales) from reporting parties, supporting the broader goal of tracking the high-level movement of cannabis throughout the supply chain. This system requires any organization or province / territory with a license to cultivate or process cannabis to send in monthly reports.

Private retailers and distributors are held to the same standard. The system is designed to enable the tracking of cannabis to prevent legal cannabis from being diverted to the illegal market and illegal cannabis from being introduced into the legal market.



¹Government of Canada. "Cannabis Tracking System Order: SOR/2018-178". Canada Gazette, Part II, Volume 152, Number 18. Available online: <http://gazette.gc.ca/rp-pr/p2/2018/2018-09-05/html/sor-dors178-eng.html> (Accessed Dec 7, 2018)

BLOCKCHAIN SAVES THE DAY

Assuring the health and safety of consumers, eliminating fraud and counterfeiting and creating a foundation of transparency to enable strong regulation are key issues in the cannabis industry. Blockchain technology has the potential to address these areas.

Blockchain enables the creation of a decentralized, distributed and trusted digital ledger that can be used to record transactions and information from multiple entities across a complex network. Past information on a block within blockchain cannot be modified without changing the information in all preceding blocks and the consensus of the network.

The vital elements of a permissioned blockchain are:

- **Decentralized:** In a blockchain, multiple nodes hold a copy of the same data. This eliminates the risk of a single point of failure.
- **Immutable:** Data is written on the blockchain using cryptographic services that cannot be altered without detection.
- **Consensus:** A decentralized shared ledger across various nodes of the business chain ensures consensus.
- **Participatory:** The governance of blockchain allows a diverse group of stakeholders to have an equal voice on issues such as data ownership, data sharing and protection.

Value Proposition

Permissioned blockchain provides the following benefits for the cannabis supply chain:

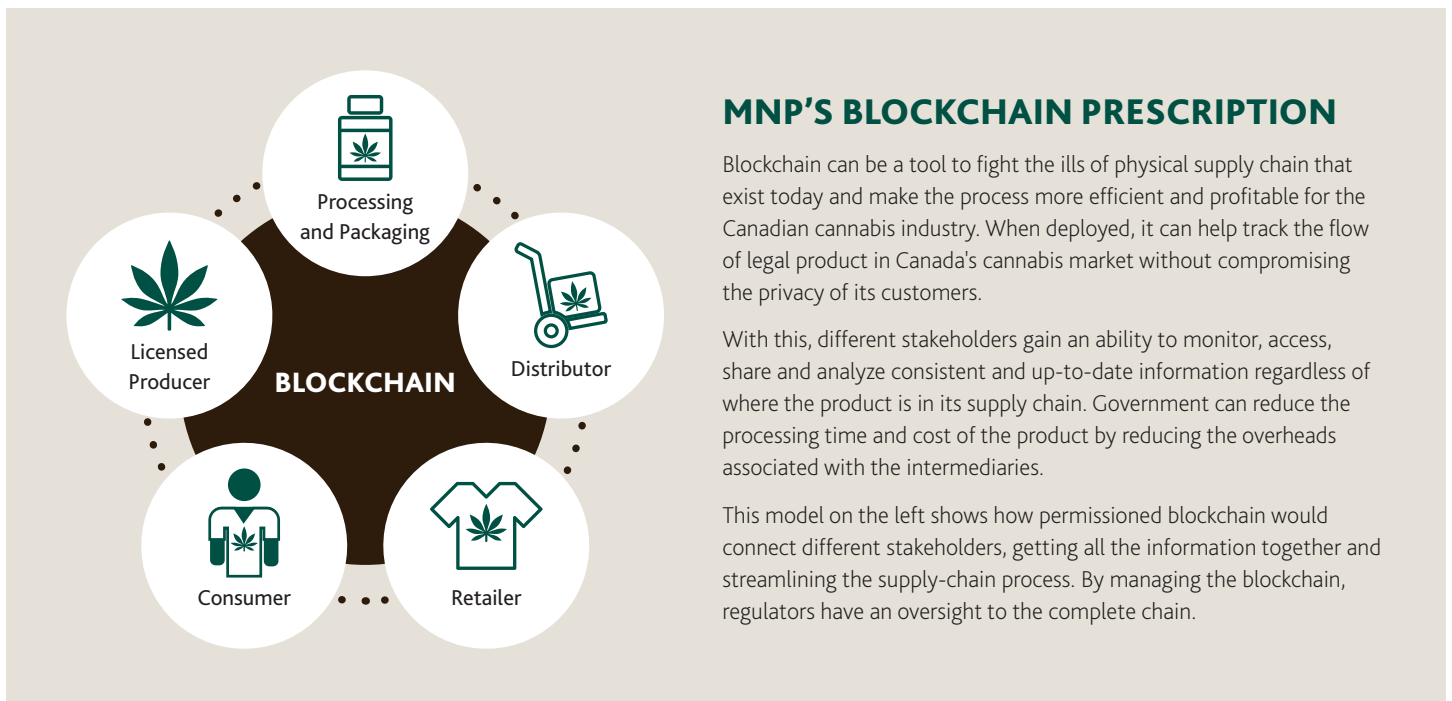
- **Transparency and Traceability:** High visibility over product and traceability leads to optimization, improved reconciliation, greater auditability and better regulatory compliance.
- **Oversight on Counterfeiting:** Governments can trust blockchain data to determine if cannabis is legally grown and who is growing it. Blockchain ensures legal sourcing with speed and flexibility due to real-time tracking.
- **Accuracy:** Through the ledger, government can monitor, access, share and analyze consistent and up-to-date information regardless of where the product is in its supply chain. It also helps with keeping lab check records and manage cannabis strain names.
- **Contract Enforcement and Management:** Digitization of documentation lowers the cost to organizations.
- **Security:** Tampering with blockchain is difficult, protecting all parties against cyber attacks and minimizing fraud risks. At all stages, the security, validity and integrity of the information is assured using blockchain's cryptographic services.
- **Damage and Mishandling Management:** Smart contracts within the business supply chain can detect events such as defective products and product recalls. This allows distributors and retailers to react to issues in real time.
- **Reduce Black Market:** With full view of the network, the government can control sourcing, selling and pricing of the product. By using the big accurate data set, with information from throughout the network, government can assist producers with real-time inventory management and help retailers identify supply / demand gaps.

For governments, this means control of sourcing, selling and pricing. For producers, it means improved inventory management due to improved supply and demand data analytics. For retailers, this means visibility over supply chain gaps and an improved ability to close those gaps.

For these reasons, the blockchain system is crucial to the overall effectiveness of the cannabis regulatory system in Canada. Blockchain improves service, cost management and product management by providing a shared record of information within different departments, with consumers and with producers. Everything is scanned and traced, allowing the state to see the full journey of every product – from being planted to being purchased by the end user.

By attaching the codes and labels already being traced, the information is easier to store, archive and search. Compliance and data transfers between licensed businesses and government agencies would be greatly improved. This approach would ensure that database information can be secured. Seed-to-sale data would be stored in way that cannot be tampered with or removed, making audits easier.

Long-term value exists as well. As cannabis becomes more available, discerning consumers will look for quality assurance and have a vested interest in knowing where their product comes from. Unreliable and inconsistent strains damage customer confidence and threaten a company's bottom line.



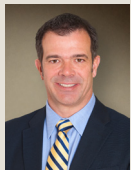
- When a crop is grown and harvested, a digital marker is issued by a trusted entity, which acts to authenticate its point of origin. This information is loaded into the blockchain.
- Smart contracts, which are immutable and distributed, can be used to automatically exchange data. They also ensure only the authorized stakeholder can create / modify the digital marker.
- Every time the physical item changes hands, the digital marker is moved in the supply chain, so the real-world chain of custody is mirrored by a chain of transactions on the blockchain.
- Each movement of the token has its own transaction that can be monitored and verified if all parties agree. Validation method for verifying transactions can be tailored to meet the business needs.
- Transactions in the blockchain are recorded with the information on different stakeholders, transaction details and time stamped with each containing an encrypted signature. This signature is the key as it allows each block of information to be securely connected to all the rest.
- Upon receiving the digital token, the consumer of the end product can verify the chain of custody all the way back to the point of origin.
- One agreed view of the complete history of the product can be accessed at any time, providing transparency and tracibility to all.

Going the Extra Mile

With all this data from end to end in the cannabis supply chain, machine learning and artificial intelligence models can be run against each one of these processes to improve efficiencies. For example, this information can tell how much it costs to transfer the product to the consumer from point A to point B during a particular time of the year for a certain product.

Using predictive analytics on the data blockchain is securing, valuable insights can be gained around what type of produce is in demand, what products should the producers be growing, what type of bioscience should they be engaging in such as oils, medicines and other products.

Blockchain can provide solutions for the issues facing the Canadian cannabis industry. Governments, producers and consumers all stand to benefit by adopting this technology because it provides detailed information in a secure space with real-time tracking. **To learn more about working with blockchain, contact our team at MNP:**



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ABOUT MNP

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