The Future Of The Agricultural Industry – Is Blockchain A New Beginning?

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CONTENTS

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INTRODUCTION

The United States agricultural supply chain reaches far beyond the farm business and includes a range of farm-related industries, the largest being food service and food manufacturing.[1] Americans' expenditures on food amount to thirteen percent of household budgets on average.[2] Individuals included in the agricultural supply chain can be categorized into three groups: (1) people involved directly in the agricultural food production (e.g., farmers); (2) people involved in the rest of the food system (e.g., processing, manufacturing, food service, and retailing); and (3) consumers.[3] The vast majority of American citizens falls into the third category.

Most food items, such as milk, meat, cereal, vegetables, and fruit, all come from farms and pass through the agricultural supply chain before being delivered to store shelves.[4] Consumers regularly frequent restaurants and supermarkets that primarily obtain their food products through the agricultural supply chain. Thus, the agricultural supply chain regularly affects consumers in more ways than an average person may realize. Further, the health and safety of consumers lie in the hands of agricultural industry suppliers because the food we eat comes from the suppliers' farms.

The Centers for Disease Control and Prevention (CDC) reports that there have been 110 foodborne disease outbreak investigations conducted in the past eight years.[5] Further, the CDC estimates that foodborne diseases cause approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States each year.[6] Known pathogens account for an estimated 14 million illnesses, 60,000 hospitalizations, and 1,800 deaths.[7] The most common foodborne illnesses being Escherichia coli (E. coli), Listeria, and Salmonella.[8] Although these illnesses cannot be prevented completely, their prevalence can be substantially decreased by

1. *Ag and Food Sectors and the Economy*, U.S. DEP'T OF AGRIC. (Dec. 16, 2020), https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy/ [https://perma.cc/J38W-GLF9].

2. *Id.*

3. INST. OF MED. & NAT'L RSCH. COUNCIL, A FRAMEWORK FOR ASSESSING EFFECTS OF THE FOOD SYSTEM, at II.5 (Madeline C. Nesheim, Maria Oria & Peggy Tsai Yih eds., 2015).

4. Alden Morse, *A Primer on Food and Beverage Distribution*, HANDSHAKE (May 15, 2018), https://www.handshake.com/blog/food-and-beverage-distribution [https://perma.cc/68QF-LNP8].

5. *List of Selected Multistate Foodborne Outbreak Investigations*, CTRS. FOR DISEASE CONTROL & PREVENTION, https://www.cdc.gov/foodsafety/outbreaks/multistate-outbreaks/outbreaks-list.html [https://perma.cc/7L3P-6AZN].

6. Paul S. Mead, Laurence Slutsker, Vance Dietz, Linda F. McCaig, Joseph S. Bresee, Craig Shapiro, Patricia M. Griffin & Robert V. Tauxe, *Food-Related Illness and Death in the United States*, 5 EMERGING INFECTIOUS DISEASES 607, 607 (1999).

7. *Id.*

8. *List of Selected Multistate Foodborne Outbreak Investigations*, *supra* note 5.

replacing old tracking and tracing methods with new technology such as blockchain. To put this potential application of blockchain into perspective, "[r]educing foodborne illnesses by just 1 percent would prevent half a million Americans from getting sick each year."[9] Thus, saving money and lives should begin with focusing on improving precautionary measures through the adoption of new tracking and tracing technology.

As we advance into a digital era, we begin to depend on technological innovations to rapidly help develop and update processes and methods within different industries. Blockchain technology—popularized by cryptocurrency—is slowly making its debut in the agricultural supply chain. Implementing a blockchain requirement for suppliers would be beneficial because it would allow agricultural suppliers and distributors to track their products in a more efficient manner. However, there are four potential legal issues that are foreseeable: (1) preemption, (2) overlapping regulatory authority, (3) applying current legal rules to new technology, and (4) contracting. This Note will specifically focus on issues of preemption, overlapping regulatory authority, and applying current legal rules to new technology, and will address why a blockchain requirement should be implemented into the agricultural supply chain.

Part I addresses the primary problems with the current state of the agricultural supply chain. Part II discusses legal regulatory issues with blockchain and how the implementation of a federal act aimed to improve traceability and transparency has affected the prescription drug industry and supply chain. Part III addresses the intended benefits of a proposed solution regarding the complete implementation of blockchain into the agricultural supply chain, the use of companies piloting blockchain technology to track and trace cattle, and a possible regulatory approach called "soft law." This Note begins with a discussion detailing how blockchain technology functions.

I. BACKGROUND

A. What Is Blockchain?

Blockchain is a database shared across a network of computers.[10] The database keeps records of information—such as deals or transactions.

9. Katy Jones, *3 Food Safety Stats That Underscore the Need for Traceability*, FOODLOGIQ: FOOD SAFETY, TRACEABILITY, AND SUSTAINABLILITY BLOG (Feb. 7, 2017), https://blog.foodlogiq.com/3-food-safety-stats-for-traceability [https://perma.cc/6SPK-72UA].

10. Maryanne Murray, *Blockchain Explained*, REUTERS GRAPHICS (June 15, 2018), https://graphics.reuters.com/TECHNOLOGY-BLOCKCHAIN/010070MF1E7/index.html [https://perma.cc/DZ4C-XBAR].

These records are bundled into what is known as a "block." Blocks are significant because they contain a "hash" or a unique code that makes it extremely difficult to breach.[11] Once the hash codes of each block are linked together, it creates a "chain," hence the name blockchain.[12] A block can be thought of as a page in a book.[13]

The words and sentences on a page are analogous to the information stored on a block. Each page is "connected with one another via their position in the book and via the page numbers."[14] "You can determine if someone removed a page from the book by checking whether the page numbers continue without leaving out a page number."[15]

A block is important because, although it is a small portion of the entire blockchain database, it is a necessary portion that needs to be connected with other blocks (just as a book cannot be read if missing pages exist).[16] However, if a block is missing or deleted, the system attempts to rebuild the database using the blocks already stored by downloading the missing block(s) from its peer network.[17]

The database of information containing records of deals and transactions is shared across a digital network through a peer-to-peer system.[18] "Similar to human beings who communicate with one another via the medium of spoken words, computers in a distributed peer-to-peer system communicate via a digital network," which in this case refers to the internet.[19] Put simply, information of transactions is shared with other computers that are all connected through a shared digital network (the internet).

Interest in blockchain arose from a need for a non-trust-centric database that would eliminate issues with trust relationships while maintaining database integrity.

> Blockchain [is a] tamperevident and tamperresistant digital ledger[] implemented in a distributed fashion . . . and usually without a

11. *Id.* The records on a blockchain are difficult to breach because they are secured through cryptography. Basically, network participants have their own private keys that are assigned to the transaction they make and that act as a personal digital signature. If a record is altered, the signature becomes invalid, and the peer network will know instantly that something has happened.

12. *Id.*

13. DANIEL DRESCHER, BLOCKCHAIN BASICS: A NON-TECHNICAL INTRODUCTION IN 25 STEPS 34 (2017).

14. *Id.*

15. *Id.*

16. *See id.*

17. *What Will Happen if a Block Is Lost on a Peer?*, STACKEXCHANGE (July 15, 2017), https://bitcoin.stackexchange.com/questions/55244/what-will-happen-if-a-block-is-lost-on-a-peer [https://perma.cc/5JQX-WT66].

18. DRESCHER, *supra* note 13, at 147.

19. *Id.* at 134.

> central authority. . . [Blockchain] enable[s] a community of users to record transactions in a shared ledger . . . [where] no transaction can be changed once published.[20]

Because blockchain is decentralized and distributed across a synced peer-to-peer network, no centralized location with all data exists; therefore, data recorded to the blockchain cannot be changed from a single computer.[21] This concept is important for users because data recorded to the blockchain cannot be manipulated by violating a single source of information.[22] Further, blockchain is a trustless technology, which means any monetary transaction over a computer network can be verified, monitored, and enforced without the presence of a centralized third-party.[23]

Additionally, blockchain creates immutable records.[24] In other words, "[n]o participant can change or tamper with a transaction after it's been recorded to the shared ledger."[25] This added security is useful because regulatory agencies like the FDA or any entity using blockchain technology can now have a sense of trust and security in the system knowing that no data recorded in the ledger will be lost or falsified. Falsifying a single record would mean forging the entire chain in millions of instances, which is virtually impossible.[26]

Blockchain technology also provides a layer of transparency. Specifically, it is possible for users to create transactions on the blockchain and view all previously recorded transactions without having their personal identity revealed.[27] For example, instead of seeing "Bob sent 1 BTC," a person viewing the record "will see '1MF1bhsFLkBzzz9vpFYEmvwT2TbyCt7NZJ sent 1 BTC.'"[28] Essentially, this feature means the record or transcript of the transaction is

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20. DYLAN YAGA, PETER MELL, NIK ROBY & KAREN SCARFONE, BLOCKCHAIN TECHNOLOGY OVERVIEW 1 (2018), https://nvlpubs.nist.gov/nistpubs/ir/2018/NIST.IR.8202.pdf [https://perma.cc/R3AM-2QZG].

21. Curtis Miles, *Blockchain Security: What Keeps Your Transaction Data Safe?*, IBM (Dec. 12, 2017), https://www.ibm.com/blogs/blockchain/2017/12/blockchain-security-what-keeps-your-transaction-data-safe/ [https://perma.cc/C8PX-RYLN].

22. *Id.*

23. ABELARDO ARREDONDO, BLOCKCHAIN AND CERTIFICATE AUTHORITY CRYPTOGRAPHY FOR AN ASYNCHRONOUS ON-LINE PUBLIC NOTARY SYSTEM, at iv (2017).

24. *See What Is Blockchain Technology?*, IBM, https://www.ibm.com/blockchain/what-is-blockchain [https://perma.cc/4LXE-LE3L].

25. *Id.*

26. Ameer Rosic, *What Is Blockchain Technology? A Step-by-Step Guide for Beginners*, BLOCKGEEKS, https://blockgeeks.com/guides/what-is-blockchain-technology/ [https://perma.cc/MJH9-3P4B].

27. *See* SATOSHI NAKAMOTO, BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM 2 (2009), https://bitcoin.org/bitcoin.pdf [https://perma.cc/8GDX-23LZ].

28. Rosic, *supra* note 26.

logged, but little recorded information is traceable to the users. However, blockchain transactions can still be verified because the technology is "pseudo-anonymous," which means the origin is traceable despite the details of the transaction being hidden.[29] For example, if "a person sends a sum of money, then the receiver will get to know that the sender is linked to a bitcoin address but will not know the actual address."[30] In other words, only the origin is traceable, while the transacting party's identity is still kept private. Thus, blockchain technology provides just about complete transparency and privacy to its users. Further, the user does not have to be a person; it can also be an entity or a business.

With a brief background of blockchain explained, this Note now moves on to address the specific non-legal challenges in the agricultural industry and how the application of blockchain can benefit these problems.

B. Agricultural Industry: Benefits and Non-Legal Challenges to Blockchain in Food Supply

The tracking systems used by the agricultural industry suffer from inefficiency and have led to problems recalling contaminated products. For example, in 2006, an E. coli outbreak occurred in the United States resulting in 199 cases of E. coli contamination, thirty-one cases of severe kidney failure (Hemolytic Uremic Syndrome), and three deaths across twenty-six states.[31] Contaminated spinach was the culprit.[32] The significance of this outbreak is the time it took the FDA to trace the source of the outbreak. The FDA took two weeks to investigate and confirm that the nationwide recall stemmed from one day's production at a single farm.[33] The inefficiency in locating the contaminated spinach within the supply chain caused a spike in food safety concerns.[34] This outbreak also unveiled an underlying problem of an inefficient national recall procedure that unnecessarily affected many food vendors and farmers.[35] Despite being the root cause of the inefficiency, paper documentation in the food supply chain continues to be the predominant method of keeping records.[36]

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29. Toshendra Kumar Sharma, *How Is Blockchain Verifiable By Public and yet Anonymous?*, BLOCKCHAIN COUNCIL (July 10, 2018), https://www.blockchain-council.org/blockchain/how-is-blockchain-verifiable-by-public-and-yet-anonymous/ [https://perma.cc/5KYU-LPDD].

30. *Id.*

31. Tim Hammerich, *Blockchain and the Future of Agriculture*, LINKEDIN (Dec. 11, 2017), https://www.linkedin.com/pulse/blockchain-future-agriculture-tim-hammerich/ [https://perma.cc/VAN4-FU72].

32. *Id.*

33. *Id.*

34. *Id.*

35. *See id.*

36. Myo Min Aung & Yoon Seok Chang, *Traceability in a Food Supply Chain: Safety and Quality Perspective*, 39 FOOD CONTROL 172, 181 (2014).

No comprehensive digital system exists to track food products through the supply chain, thereby slowing down regulatory response to outbreaks of foodborne illnesses.[37]

Foodborne illness is one of the greatest dangers the agricultural industry faces. In the United States alone, close to fifty million reported cases of foodborne illnesses occur each year, resulting in substantial morbidity and mortality with additional economic burdens to health care and productivity.[38] Foodborne illnesses are especially dangerous for those people without access to health care and for those of low socioeconomic status.[39] These illnesses are linked to "[s]ymptoms[ ]such as vomiting, diarrhea[,] and fever," which can intensify to a point where the illness can become life-threatening to "those whose immune systems are less able to fight off harmful bacteria."[40] Mickey Parish, FDA Microbiologist, says the prevention of foodborne illness is the key to mitigating risks for those without access to health care or of low socioeconomic status.[41] By establishing safety and cleanliness requirements for farmers, food companies, and importers, the FDA expects that implementation of the FDA Food Safety Modernization Act (FMSA) will reduce the chances of pathogens such as E. coli reaching those individuals most at risk.[42] Lindsay F. Wiley, Director of Health Law & Policy at American University Washington College of Law,[43] suggests that health justice is a needed lens for addressing this disparity in access to health care and public health hazard.[44]

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37. Sylvain Charlebois, Brian Sterling, Sanaz Haratifar & Sandi Kyaw Naing, *Comparison of Global Food Traceability Regulations and Requirements*, 13 COMPREHENSIVE REV. IN FOOD SCI. & FOOD SAFETY 1104, 1108 (2014). Although there are no "comprehensive" digital systems fully implemented, Walmart is piloting blockchain technology as a digital system in their two-year pilot project. *See* Hammerich, *supra* note 31.

38. Robert L. Scharff, *Economic Burden from Health Losses Due to Foodborne Illness in the United States*, 75 J. FOOD PROT. 123, 123 (2012). The Economic Research Service (ERS) estimates that the 63,000 illnesses caused by E. coli each year in the United States imposes a $271.4 million in economic burden. E. coli carries an annual five percent mortality rate and those who survive have an increased risk for developing chronic kidney disease. *See id.*

39. *See* Chryssa V. Deliganis, *Death by Apple Juice: The Problem of Foodborne Illness, The Regulatory Response, and Further Suggestions for Reform*, 53 FOOD & DRUG L.J. 681, 686 (1998).

40. *Foodborne Illness: Especially Dangerous for the Vulnerable*, U.S. FOOD & DRUG ADMIN. (June 4, 2014), https://www.fda.gov/consumers/consumer-updates/foodborne-illness-especially-dangerous-vulnerable [https://perma.cc/L46F-G4QT].

41. *Id.*

42. *Id.*

43. *Lindsay F. Wiley*, AM. UNIV. WASH. COLL. L., https://www.wcl.american.edu/community/faculty/profile/wiley/bio [https://perma.cc/QU44-QGCV] (Biography of Lindsay F. Wiley).

44. Lindsay F. Wiley, *Health Law As Social Justice*, 24 CORNELL J.L. & PUB. POL'Y 47, 52 (2014).

Another problem with the agricultural supply chain is consumer trust in food suppliers.[45] Consumers no longer trust the origin of their foods.[46] The problem began with consumers' lack of access to knowledge about where food comes from, how that food is grown, and how many intermediaries process food before it reaches shelves.[47] The problem then amplified with the implementation of genetically modified organisms (GMO), fraudulent food certification, and continued foodborne illness outbreaks.[48] These issues create a serious problem because consumer trust creates both brand loyalty and a connection where consumers genuinely enjoy engaging with the brand and using the product.[49] A lack of consumer trust in the agricultural supply chain can have massive repercussions on the industry as a whole. For example, if consumers continue to lose trust in the agricultural supply chain, large conglomerate companies like Walmart or Costco will begin to lose customers and profits.[50] Therefore, a blockchain requirement would help rebuild consumers' trust in the agricultural supply chain by allowing consumers complete transparency in tracking where their food came from.

The United States' food supply chain is extremely complex, and the delivery of food products to consumers involves many different actors.[51] The major drivers of the agricultural supply chain include (1) environmental and natural resources; (2) markets; (3) state and federal policies; (4) science and distribution technology; and (5) social organizations.[52] This Note focuses on the fourth category, science and distribution technology, because this driver is the most related to the use of blockchain technology.

In the early eighteenth century, food entering into the supply chain was primarily distributed using wagons and canal boats.[53] Then, in the mid to late eighteenth century, technology began to improve and food was distributed using steam engines and railroads, allowing food products to reach further regions.[54] However, an established way to track and trace

45. Andrew Arnold, *The Agricultural Supply Chain Can Massively Benefit from Blockchain*, FORBES (Aug. 29, 2018), https://www.forbes.com/sites/andrewarnold/2018/08/29/the-agricultural-supply-chain-can-massively-benefit-from-blockchain/#544a7774423e [https://perma.cc/HT9C-BD2K].

46. *Id.*

47. *Id.*

48. *Id.*

49. Karlyne Zovitsky, *Why Consumer Trust Is More Important Than Ever*, CONVERSION ADVANTAGE, https://www.conversionadvantage.com/consumer-trust-important-ever/ [https://perma.cc/7F4S-D23R].

50. *See generally id.*

51. *See* A FRAMEWORK FOR ASSESSING EFFECTS OF THE FOOD SYSTEM, *supra* note 3, at 46.

52. *See id.*

53. *Id.*

54. *Id.*

these products once they left the farm did not exist. The technological revolutions in the nineteenth and twentieth centuries made it possible for food products to be distributed through roads, refrigerated rail cars, planes, and large ships.[55] Further, the creation of the internet and computers improved tracking and tracing technology as well.

Companies like Dole Foods launched their own radio frequency identification (RFID) initiative in 2006 to improve the traceability of their food products.[56] Dole Foods used RFID and global positioning system (GPS) technology "to track vegetables from harvest through processing, packaging, and delivery to stores."[57] This technology is still used in the agricultural supply chain today and serves as a milestone from where the supply chain originated.

The improvements to tracking and tracing technology discussed in this section have already helped prevent foodborne illnesses and increased consumer trust in food suppliers. Dole's use of GPS and RFID technology allows consumers to access more information about the food products they consume.[58] Thus, the added layer of transparency provided with new tracking system technology will help to rebuild consumer trust in the agricultural supply chain. These benefits are excellent examples that show how implementing a blockchain requirement can continue to improve tracking and tracing methods within the agricultural supply chain. Next, this Note will address the legal issues associated with implementing a blockchain requirement.

II. CURRENT AUTHORITY AND LEGISLATION—ADDRESSING THE PROBLEM

This section will focus on three legal issues that pose the greatest challenge to implementing a blockchain requirement into the agricultural supply chain. The first legal hurdle this Note will explore is federal preemption of state laws. The second hurdle is conflicting regulations between federal agencies with overlapping authority. Finally, the third hurdle is the challenges in applying current legal rules to new technology and what that application will mean for attorneys.

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55. *Id.*

56. Elliot Maras, *RFID: A Tool for Tracking Products, Assets and More*, FOOD LOGISTICS (Dec. 17, 2015), https://www.foodlogistics.com/technology/article/12141721/rfid-a-tool-for-tracking-products-assets-and-more [https://perma.cc/WS3V-KCLG]. RFID technology functions when a transceiver reads radio frequencies and transmits them to an RFID tag. *Id.* The identification information is then transmitted from a tiny computer chip embedded in the tag and broadcasted to the RFID reader. *Id.*

57. *Id.*

58. *See id.*

A. Preemption of State Laws

Looking into the potential application of blockchain into certain industry supply chains may raise concerns regarding state law being preempted by new FDA regulations. The Drug Supply Chain Security Act (DSCSA)—a federal act—was created in 2013 as a response to counterfeit pharmaceutical drugs entering the United States medical supply chain.[59] The DSCSA used track and trace technology as a solution to the counterfeit drug scandal.[60] This technology is similar to blockchain because it improves the transparency and traceability of a certain product within a specified industry. The legal effect of the DSCSA was that it preempted states from enacting laws using tracking and tracing methods for prescription drugs.

Preemption may create a problem because it either expressly or impliedly takes away state power to create standards that are contrary to a federal law's explicit language. For example, in the October 2014 draft guidance, the FDA interpreted the previous track and trace provision to have preempted state requirements for tracing drugs, leaving the states no power to regulate the traceability of prescription drugs.[61]

However, under limited circumstances, preemption may be appropriate. Federal preemption can allow drug manufacturers to reduce compliance costs, which would eventually result in lower drug prices. For example, airline safety is best regulated at the federal level because commercial aircrafts fly rapidly between different jurisdictions. Stronger laws in one state would mean regulations could change several times within an hour.[62]

The similarities between DSCSA preemption and recent Environmental Protection Agency (EPA) regulatory action, specifically the disposal of hazardous waste pharmaceuticals, suggest EPA regulations may face similar problems to those posed in the prescription drug industry.[63] Since the DSCSA was signed into law, some have argued the act preempted all state hazardous waste regulatory authority.[64] However, the EPA disagreed with this interpretation of the act.[65] Section 585 of the

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59. Christopher R. Smith, *INSIGHT: The Drug Supply Chain Security Act and Preemption of State Laws*, BLOOMBERG L. (Aug. 2, 2019), https://news.bloomberglaw.com/us-law-week/insight-the-drug-supply-chain-security-act-and-preemption-of-state-laws [https://perma.cc/6E6P-UP4K].

60. *Id.*

61. *Id.*

62. *Preemption*, PUB. HEALTH L. CTR., https://www.publichealthlawcenter.org/topics/commercial-tobacco-control/preemption [https://perma.cc/M3Q9-8TVL].

63. Smith, *supra* note 59.

64. Management Standards for Hazardous Waste Pharmaceuticals and Amendment to the P075 Listing for Nicotine, 84 Fed. Reg. 5816, 5838 (Feb. 22, 2019) (to be codified at 40 C.F.R. pts. 261, 262, 264, 265, 266, 268, 270, 273).

65. *Id.*

DSCSA specifically avoids preempting state requirements, such as the Resource Conservation and Recovery Act (RCRA) hazardous waste laws.[66] States should have some control over the way hazardous waste produced in their state is disposed. One state may be better equipped to deal with hazardous waste than another and thus the state's legislative body should be able to regulate.

The scope of the DSCSA must also be addressed where other federal regulatory agencies' authority seems to overlap. Christopher R. Smith, Senior Counsel at Epstien Becker Green,[67] mentions that "[w]hile this is not a state preemption issue, the regulatory scope of the DSCSA must be considered when other federal regulatory efforts appear to regulate the same space, as in the case with proposed federal drug importation legislation and the EPA hazardous waste pharmaceuticals regulation."[68] Mr. Smith's statement is important because the pharmaceutical industry is not the only industry that generates hazardous waste. Agriculture producers use enormous amounts of chemical pesticides and herbicides on crops.[69] Each year, "approximately 110 billion pounds of fertilizer are applied to farm fields throughout the U.S. [with] almost one-half of that total [being] non-nutrient material of unknown composition."[70] "The fertilizer industry has acknowledged that about 150 million pounds of hazardous waste end up in the agricultural system each year."[71] There are "loopholes in current EPA regulations and many state regulatory systems" that allow for agriculture producers to continue producing and disposing of their hazardous waste.[72] Thus, because the FDA is a federal regulatory body that regulates in the same space as the EPA, there would not necessarily be a preemption issue per se. However, the loopholes could cause similar problems nonetheless if blockchain is fully implemented into the agricultural supply chain.

With that being said, it is increasingly important for suppliers in the agricultural supply chain to pay close attention to the effect the DSCSA tracking and tracing technology had in the counterfeit drug scandal because similar problems may arise in the agricultural industry if

66. *Id.*

67. *Christopher R. Smith*, EPSTEIN BECKER GREEN, https://ebglaw.com/christopher-r-smith [https://perma.cc/6UAG-YHGF] (Biography of Christopher R. Smith).

68. Smith, *supra* note 59.

69. *Agricultural Hazardous Wastes*, CLIMATE POL'Y WATCHER (Nov. 25, 2019), https://www.climate-policy-watcher.org/waste-management/agricultural-hazardous-wastes.html [https://perma.cc/7Y8U-DBFE]. Agencies include the Department of Health and Human Services (HHS), FDA, and U.S. Department of Agriculture's (USDA) Food Safety and Inspection Service (FSIS).

70. *Id.*

71. *Id.*

72. *Id.*

blockchain is integrated. The DSCSA transformed the pharmaceutical industry by "making it safer, more transparent, and more efficient."[73] Although the tracking and tracing technology used with the DSCSA was not the exact same technology as blockchain, the rationale behind implementing the technology is very similar.[74] Therefore, the DSCSA is important because it shows the types of regulatory and preemption issues that may arise from implementing a blockchain requirement into the agricultural supply chain.

B. Conflicting Regulations Between Federal Agencies with Overlapping Authority

Federal law divides regulatory authority over food safety between multiple agencies.[75] The FDA is primarily responsible for preventing and responding to food contamination.[76] The FDA uses several tools to ensure food safety across the nation, including inspections, recalls, sampling, and voluntary destruction of selected products.[77] Complementing FDA jurisdiction, the Department of Agriculture's Food Safety Inspection Service (FSIS) has similar authority over meat, poultry, and processed eggs.[78] Additionally, the CDC conducts food safety surveillance, investigates multistate outbreaks, and coordinates state and local public health actions.[79]

It is true that organizations like the FDA, FSIS, and CDC do an excellent job monitoring and controlling food safety; however, areas still exist that need to be further developed to decrease the probability of a spread in foodborne illness. Working to improve consumer trust and tracking and tracing methods would better supply chain management by reducing the likelihood of future foodborne illness outbreaks. Even in the interest of public health, overly aggressive actions or requirements by regulatory organizations may disincentivize the food industry from

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73. *Everything You Need to Know About the DSCSA in 2018*, TWO LABS PHARMA SERVS.: BLOG (Sept. 24, 2018), http://blog.twolabs.com/everything-you-need-to-know-about-the-dscsa-in-2018 [https://perma.cc/8HWY-3AYV].

74. Smith, *supra* note 59, at 5839–40.

75. *See* U.S. GOV'T ACCOUNTABILITY OFF., GAO-17-74, FOOD SAFETY: A NATIONAL STRATEGY IS NEEDED TO ADDRESS FRAGMENTATION IN FEDERAL OVERSIGHT 6–7 (2017), https://www.gao.gov/assets/gao-17-74.pdf [https://perma.cc/QS3K-7DRS].

76. *See What Does FDA Do?*, U.S. FOOD & DRUG ADMIN. (Mar. 28, 2018), https://www.fda.gov/about-fda/fda-basics/what-does-fda-do [https://perma.cc/4966-FFQV].

77. *See generally* FDA Food Safety Modernization Act, Pub. L. No. 111-353, 124 Stat. 3885 (2011) (amending the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. §§ 301–399i (2018)).

78. 21 U.S.C. §§ 451–72 (2019); 21 U.S.C. § 601 (2019); 21 U.S.C. §§ 1031–56 (2019).

79. 21 U.S.C. § 2224; *CDC and Food Safety*, CTRS. FOR DISEASE CONTROL & PREVENTION (June 25, 2020), https://www.cdc.gov/foodsafety/cdc-and-food-safety.html [https://perma.cc/8NC9-4ND2].

incorporating the blockchain platform.[80] Further, "[c]ommand and control regulatory approaches administered by a central government may suffer from perceived or real inefficiency, overly burdensome costs to industry, and restricting flexibility to innovate with emerging blockchain systems."[81]

A complete implementation of a blockchain requirement would eliminate a central government entity's ability to have all the regulatory and decision-making power because of blockchain's decentralized nature. Also, blockchain implementation would not result in burdensome costs because unlike many businesses that charge transaction fees, transactions made and recorded on the blockchain are free.

C. Challenges of Applying Existing Legal Rules to New Technology

Blockchain has three different versions, each with different focuses in the global financial technological revolution.[82] "Blockchain 1.0 emphasizes virtual currency, Blockchain 2.0 isolates technology and protocol applications as to contracts, and Blockchain 3.0 is the expansion of the technological applications beyond finance and markets."[83] Blockchain 3.0 and its application to the agricultural context is the subject of this Note. Legal issues will primarily arise in determining what area of law will apply to the industries using blockchain technology.

An example of a challenge which arose in applying existing legal rules to new technology was the Security and Exchange Commission's (SEC's) attempt to prosecute a Bitcoin Ponzi scheme.[84] That case, *SEC v. Shavers*, centered on a factual dispute regarding whether Bitcoin should be considered a security law issue and thus subject to SEC jurisdiction.[85] The court ruled that because "Bitcoin can be used as money, and the investments at issue met the requirements for an investment contract, the SEC could exercise jurisdiction" as it involved a security law issue.[86]

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80. Laura Shin, *Crypto Industry Frustrated by Haphazard Regulation*, N.Y. TIMES (June 27, 2018), https://www.nytimes.com/2018/06/27/business/dealbook/crypto-industry-regulation.html [https://perma.cc/Y8HYHBLH].

81. Walter G. Johnson, *Blockchain Meets Genomics: Governance Considerations for Promoting Food Safety and Public Health*, 15 J. FOOD L. & POL'Y 74, 94–95 (2019).

82. Elizabeth Sara Ross, *Nobody Puts Blockchain in a Corner: The Disruptive Role of Blockchain Technology in the Financial Services Industry and Current Regulatory Issues*, 25 CATH. U. J.L. & TECH. 353, 359–60 (2017).

83. *Id.*

84. Nathan Fulmer, *Exploring the Legal Issues of Blockchain Applications*, 52 AKRON L. REV. 161, 174 (2019).

85. *Id.* at 174, 174 n.78 (citing Sec. & Exch. Comm'n v. Shavers, No. 4:13-CV-416, 2013 WL 4028182 (E.D. Tex. Aug. 6, 2013)).

86. *Id.* at 174.

Shavers illustrates how challenges in applying existing legal rules to emerging technology exist.

Because blockchain's application into the agricultural industry is currently only being tested in parts and not fully implemented, little legislation or litigation exists in this area, and it is difficult to determine how emerging problems will be reviewed. However, a potential legal issue that may arise in utilizing blockchain within the agricultural industry is interpreting and writing computer code—a language that is necessary to use blockchain. Attorneys on either side of an agreement, such as a purchasing agreement for produce between a buyer and seller recorded on a blockchain ledger, will need to know enough about computer code to be able to properly draft and review contracts involving blockchain. Attorneys will easily be able to understand the technical aspects of contract law such as offer, acceptance, consideration, and mutual assent. However, any part of the contract with specific references to a blockchain record may require attorneys to learn how to interpret computer code so that they can fully grasp the issue at hand and know how to best advise their respective clients.

Further, because traditional contract law is structured to address issues that arise after a contract is formed and parties have agreed to certain terms, a question arises as to whether current contract law will need to accommodate pre-contractual agreements as well.[87] Just as blockchain is being tested in the agricultural industry to improve tracking and tracing methods, blockchain is already being implemented into contract law through the use of smart contracts, which raise similar problems to the one aforementioned (i.e. attorneys interpreting computer code).[88]

Given that the nodes on a blockchain can be located anywhere in the world, another potential issue is the ability of blockchain to cross jurisdictional boundaries. A node is a "ledger . . . maintained simultaneously across a network of unrelated computers or servers."[89] The fact that nodes are not located in a single location may create a problem in determining which jurisdiction governs disputes associated with blockchain nodes.[90] For example, "in the event a fraudulent or erroneous transaction," determining the "location within the blockchain [will] be challenging" because "every transaction could potentially fall under the

87. *Id.* at 176.

88. *See generally* JONATHAN BECKHAM & MARIA SENDRA, SMART CONTRACTS LEAD THE WAY TO BLOCKCHAIN IMPLEMENTATION (2018).

89. John McKinlay, Duncan Pithouse, John McGonagle & Jessica Sanders, *Blockchain: Background, Challenges and Legal Issues*, DLA PIPER (Feb. 2, 2018), https://www.dlapiper.com /en/uk/insights/publications/2017/06/blockchain-background-challenges-legal-issues/ [https://perma.cc/DE2W-RXE9].

90. *Id.*

jurisdiction(s) of the location of each . . . node in the network."[91] In such case, tracing back a fraudulent transaction may be slow and potentially inaccurate. Similar to the problem of attorneys needing to learn how to interpret computer code, attorneys may face the problem of learning how to locate and find these erroneous transactions within the blockchain. Until more legislation and litigation exists regarding blockchain regulation, uncertainty for attorneys seem likely. Thus, attorneys will need to find proactive ways to best help their clients. A proactive approach would involve attorneys learning basic blockchain lingo and being prepared to advise clients on impacts such as risk, transacting speed, fraud, and the cost of adopting blockchain systems.[92]

It is inevitable that legal issues will surface with the implementation of a blockchain requirement. However, this Note will discuss possible solutions to these challenges.

III. ANALYSIS AND PROPOSED SOLUTION

This section analyzes the feasibility of implementing a blockchain requirement into the agricultural supply chain and address a possible solution to the challenges mentioned in the previous section. First, this section discusses a public meeting held by the FDA in which experts in food safety and tech-enabled traceability speak about a new era of food safety where technologies like blockchain are implemented. Second, this section discusses the results of two companies within the agricultural industry that have implemented blockchain technology into their supply chain. Finally, this section ends with an analysis of why using soft law as a regulatory approach will help prevent preemption and overlapping regulatory authority issues.

A. Food and Drug Administration Public Meeting

On October 21, 2019, the FDA held a public meeting discussing an initiative called "A New Era of Smarter Food Safety."[93] The purpose of this meeting was to facilitate a discussion amongst experts in food safety and tech-enabled traceability.[94] These experts shared their opinion on new technologies they felt would help to create a more digital, traceable, and

91. *Id.* The federal government could create a private blockchain for use in the agricultural supply chain, which could hypothetically solve some of these jurisdictional issues.

92. Caitlin Moon, *Blockchain for Lawyers 101: Part 2*, LAW TECH. TODAY (Jan. 31, 2017), https://www.lawtechnologytoday.org/2017/01/blockchain-lawyers-101-part-2/ [https://perma.cc/6YMB-H53A].

93. Ana Alexandre, *US FDA to Hold Meeting on Blockchain and AI in Food Traceability*, COINTELEGRAPH (Sept. 18, 2019), https://cointelegraph.com/news/us-fda-to-hold-meeting-on-blockchain-and-ai-in-food-traceability [https://perma.cc/K9X3-34BE].

94. *Id.*

safer system to ultimately protect consumers from contaminated food.[95] This meeting was significant because the FDA discussed the feasibility of implementing blockchain technology into the agricultural supply chain. During this meeting, more than 100 experts participated in breakout sessions and addressed the following topics: (1) tech-enabled traceability and foodborne outbreak response; (2) smarter tools and approaches for prevention; (3) food safety culture; and (4) new business models and retail modernization.[96] The remainder of this section will discuss each breakout session individually and provide an analysis of how the FDA plans to create a new era of food safety.

The first breakout session focused on tech-enabled traceability and foodborne outbreak response, providing an opportunity for stakeholders to "discuss traceability, smarter tools, and approaches that will greatly reduce the time it takes to trace the origin of a contaminated food."[97] Maria Palombini, Director of the Institute of Electrical and Electronics Engineers (IEEE) Standards Association, identified the problem with implementing blockchain technology into the agricultural supply chain as not being a regulatory or technology-based problem.[98] Instead, Ms. Palombini explained that the real question is whether farmers and growers will be willing to add foreign technology to their already demanding workload without some type of incentive.[99]

Suf Alkhaldi, Associate Director for Business and Safety Operations for the FDA, provided a two-step recommendation that addresses this concern.[100] The first step allows farmers and growers who implement blockchain technology to put a label on their product that clearly identifies the product as traceable from source to table.[101] The second step requires establishing trust and building a rapport with smaller-scale farmers and growers.[102] Mr. Alkhaldi believes that by applying these two steps, smaller farmers and growers will be able to sell their products outside of their regular market demographic.[103] In turn, this system incentivizes the

95. *See id.*; *New Era of Smarter Food Safety Blueprint*, U.S. FOOD & DRUG ADMIN. (Feb. 9, 2021), https://www.fda.gov/food/new-era-smarter-food-safety/new-era-smarter-food-safety-blueprint.

96. U.S. FOOD & DRUG ADMIN., FOOD FOR THOUGHT: IDEAS ON HOW TO BEGIN A NEW ERA OF SMARTER FOOD SAFETY 1 (2019).

97. Vinetta Howard-King, Dir., Off. of Hum. & Animal Food Operations, Remarks at the Food and Drug Administration Public Meeting AM Breakout for Tech-Enabled Traceability & Foodborne Outbreak Response 6 (Oct. 21, 2019), https://www.fda.gov/media/132989/download [https://perma.cc/78NC-RFRG].

98. *Id.* at 13.

99. *Id.*

100. *Id.* at 15–16.

101. *Id.*

102. *Id.*

103. *Id.*

farmers and growers by providing an additional way for them to increase profits by selling to the new market.[104] Further, the extra money could be used to cover additional costs incurred with their updated blockchain integrated process.[105]

Another problem that was brought up relating to tech-enabled traceability was the comingling that occurs in packing houses. For example, German Suarez, with The Fresh Fruit Group organization, noted that "the [current food] industry can do a fairly good job tracing [produce] to . . . packing house[s]. But, the amount of blending and exchanging and shifting of [the] product that goes on in a packing house today, it's just incredible."[106] In explaining how blockchain could serve as a way of commingling, Mr. Suarez introduced the concept of standardization, where regulatory agencies like the FDA regulate and create a standardized process of tracking produce that growers of any size must follow.[107] Standardization is an idea that could be implemented into the food service industry by having regulatory agencies such as the FDA regulate and create a standardized process of tracking produce that growers of any size must follow.[108] Mr. Suarez explained that money will always be an issue in implementing new and emerging technologies such as blockchain.[109] However, when promising technology that is small becomes very big, companies normally then ask, "why didn't we spend the money to be proactive about it?"[110] Though implementing a standardized process or method poses challenges, blockchain can offer a solution to facilitate standardization within the food industry through storing data from producers that tracks where produce has been and will go. Moreover, because blockchain is more secure and accessible than current tracking and tracing technology, it represents a promising technology to be implemented with great upside.[111]

Another breakout session addressing smarter tools and approaches for prevention focused on brainstorming new ideas related to prevention

104. *Id.*

105. *See id.*

106. Vinetta Howard-King, Dir., Off. of Hum. & Animal Food Operations, Remarks at the Food and Drug Administration Public Meeting PM Breakout for Tech-Enabled Traceability & Foodborne Outbreak Response 15 (Oct. 21, 2019), https://www.fda.gov/media/133010/download [https://perma.cc/HD7H-7PTH].

107. *See id.*

108. *See id.* at 16.

109. *Id.*

110. *Id.*

111. *See* Aung & Chang, *supra* note 36, at 182.

of foodborne illnesses.[112] Experts in attendance answered the following question: "What are the most significant actions [the] FDA could undertake to promote and support the use of smarter tools for prevention?"[113] Ms. Kowalcyk, Director of the Center for Foodborne Illness Research & Prevention at Ohio State University, said that the already-existing data within the food system needs to be leveraged, which can be done through making that data more accessible and developing partnerships with industry and academic experts in data science.[114] The majority of the answers were similar to Barbara Kowalcyk's response.

On the other hand, making existing data more accessible to the common person might raise cyber-security issues and potential lawsuits because the same regulatory power over the data would exist, but now more people would have access to it. Dileep Thatte, with the manufacturing extension partnership of the National Institute of Standards and Technology (NIST),[115] offered a solution to this problem. Mr. Thatte explained that the NIST already has a memorandum of understanding (MOU) with the FDA for small and medium-sized producers.[116] The MOU protects and prevents any safety issues that could arise with implementing smarter tools by increasing the regulatory power over the existing data related to food safety and the food supply chain.[117] Allowing the FDA to have more regulatory power helps prevent safety issues that arise from things like the spread of misinformation of food products because the FDA can now limit what information consumers can access.

The third breakout session focused on food safety culture and addressed what the FDA can do to support and encourage companies to adopt new food-safety technology. Oscar Garrison, Senior Vice President of the United Egg Producers, emphasized that if the goal is to establish food safety throughout the entire supply chain, special attention needs to be given to smaller producers.[118] The agricultural supply chain is primarily made up of massive, conglomerate corporations. However, a small percentage of smaller producers remain in the supply chain.[119] Large or small, the agricultural supply chain needs to have a shared food-safety

112. Joann Givens, Dir., Off. of Hum. & Animal Food Operations W., Remarks at the Food and Drug Administration Public Meeting: AM Breakout for Smarter Tools and Approaches for Prevention 7 (Oct. 21, 2019) https://www.fda.gov/media/132990/download [https://perma.cc/C65J-B255].

113. *Id.* at 7.

114. *Id.* at 13.

115. *Id.* at 9.

116. *Id.*

117. *See id.*

118. Chris Waldrop, Senior Pub. Health Educator, Div. Of Pub. Health Informatics & Analytics, Remarks at the Food and Drug Administration Public Meeting: PM Breakout for Food Safety Culture 9–10 (Oct. 21, 2019), https://www.fda.gov/media/133001/download [https://perma.cc/ZZ4J-RRUF].

119. *See id.*

understanding between all producers. Mr. Garrison elaborated further by saying that consumer education is another critical issue to address.[120] It is one thing to properly follow protocol on the production side of the supply chain. However, Mr. Garrison explained that with problems such as foodborne illnesses, a particular concern arises due to the consumer's lack of knowledge of how to properly cook, store, and handle certain produce.[121] Thus, to fully establish a food safety culture that functions effectively, the system needs to provide additional attention to incorporating smaller producers and educating consumers.

Finally, the last breakout session focused on new business models and retail modernization. A majority of this discussion also focused on the lack of standardization of the food industry and involved similar responses to the breakout sessions for both tech-enabled traceability and foodborne outbreak. James Rogers, Director of Food Safety Research and Testing at Consumer Reports, explained that currently, if something goes wrong with a shipment, consumers have no uniform way to deal with the problem.[122] Mr. Rogers spoke about how the FDA should be the regulatory agency to set some sort of standard for the industry to help consumers when something goes wrong.[123] Mr. Rogers suggested standards such as "a 1-800 number, a website, someone [customers] can talk to, to say, hey, it[] seems like my chicken is warm that came in the shipment. Who do I call? What do I do about it? Are you going to replace it? What's the procedure?"[124]

The FDA would be the appropriate agency to implement this type of standardized practice into their supervisory model because they are the current regulatory agency governing the food industry. Also, because the FDA's primary responsibility is to prevent and respond to food contamination, this organization would be adequately equipped to answer questions and problems related to the food industry.[125] A uniform standard, where customers from large and small producers can go to get help, should be the first step in introducing standardization within the food industry. As Mr. Rogers suggested, the FDA should be the regulatory agency to control

120. *See id.*

121. *Id.*

122. Laurie Farmer, Dir., Office of State Coop. Programs, Remarks at the Food and Drug Administration Public Meeting: AM Breakout for Adapting to New Business Models and Retail Food Safety Modernization 7–8 (Oct. 21, 2019), https://www.fda.gov/media/132991/download [https://perma.cc/ZW9K-Y726].

123. *See id.*

124. *Id.* at 8.

125. *See What Does FDA do?*, *supra* note 76.

these new polices as this organization decides what is standardized within the food industry.[126]

With that being said, the next step could be to follow Mr. Suarez's note from the first breakout session: implement blockchain as the new standardized technology that the FDA will enforce and regulate for producers of any size within the agricultural industry. In a sense, creating a uniform customer service point of contact can be thought of as a way to ease into the second standardization step: implementing blockchain technology.

B. Application of Blockchain—Benefits to the Agricultural Industry

Complete implementation of a blockchain requirement into the agricultural industry will do five things: (1) improve food safety; (2) cut down on transaction costs; (3) open new markets; (4) improve logistics; and (5) reduce fraud and counterfeit food products.[127] Each of these benefits is centered around blockchain improving traceability and transparency within the supply chain.[128]

These benefits can be seen in companies utilizing blockchain today. For instance, the agricultural conglomerate, Cargill Inc., has used blockchain technology to let shoppers trace frozen turkeys they purchase from the store back to the farm that raised them.[129] Cargill mentions, "in the food industry, a blockchain-based approach could make recalls faster and better pinpoint where affected products wound up, though much depends on ingredient suppliers, food manufacturers, distributors, retailers, and food-service companies adopting a common system and standardizing data."[130] Cargill also used blockchain technology in a $12 million intercontinental wheat trade and stated, "[W]e see this transaction as the latest example of how working together and using technology to solve challenges can improve trade, as well as traceability, food safety, nutrition and more."[131]

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126. AM Breakout for Adapting to New Business Models and Retail Food Safety Modernization, *supra* note 122, at 8.

127. *See* Tim Hammerich, *5 Potential Use Cases for Blockchain in Agriculture*, MEDIUM (Jan. 4, 2018), https://futureofag.com/5-potential-use-cases-for-blockchain-in-agriculture-c88d4d2207e8 [https://perma.cc/XL9Q-YNH7].

128. *What Are the Applications of Blockchain in Agriculture?*, KRYPTOGRAPHE (Oct. 12, 2019), https://www.kryptographe.com/applications-blockchain-agriculture/ [https://perma.cc/XY5E-49VZ].

129. Jacob Bunge, *Latest Use for a Bitcoin Technology: Tracing Turkeys from Farm to Table*, WALL ST. J. (Oct. 25, 2017), https://www.wsj.com/articles/latest-use-for-a-bitcoin-technology-tracingturkeys-from-farm-to-table-1508923801 [https://perma.cc/CL9R-PM5K].

130. *Id.*

131. Mohammad Musharraf, *Cargill and Rabobank Use Blockchain for a $12 Million Intercontinental Wheat Trade*, COINTELEGRAPH (Apr. 14, 2020), https://cointelegraph.com/

Another company, BeefChain—a Wyoming-based cattle company—is setting the stage for blockchain application because it currently use blockchain on some of its ranches.[132] The company's goal is to use blockchain tags to keep its cattle separate throughout the entire processing system so that it can hopefully increase the value of its cattle by ten to twenty percent.[133] With this goal in mind, BeefChain helps "consumers already pay[ing] a premium for what is labeled 'grass-fed' beef but have no way of verifying [these] claims."[134] BeefChain's solution creates a model that (1) brings technology to the rancher in order to enhance traceability and improve humane handling; and (2) creates an end-to-end supply chain solution through BeefChain investment in feedlot and processing operations.[135] As such, BeefChain is a prominent example of how a company within the agricultural supply chain can successfully implement blockchain technology into its operations. However, current regulations governing the agricultural system need to be updated before a complete blockchain requirement is feasible.

C. "Soft Law"—How a Blockchain Requirement Should Be Regulated

In order to successfully incorporate blockchain into the agriculture industry, the agricultural supply chain may benefit from "softer" regulatory approaches. Softer approaches offer a spectrum of regulatory mechanisms lacking in traditional legal enforceability.[136] As such, soft law enables more voluntary, innovative, and adaptable regulatory possibilities by expanding definitions of oversight to include regulation by private or public-private entities.[137] In other words, soft law provides a less stringent way of denoting agreements, regulations, and principles that are not legally binding on the parties involved.[138]

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news/cargill-and-rabobank-use-blockchain-for-a-12-million-intercontinental-wheat-trade [https://perma.cc/8C3V-WPJ2].

132. Kamila Kudelska, *Where's the Beef? Wyoming Ranchers Bet on Blockchain to Track It*, NAT'L PUB. RADIO (Aug. 15, 2018), https://www.npr.org/sections/thesalt/2018/08/15/639001393/this-wyoming-company-is-trying-toput-blockchain-to-use-in-the-agriculture-indus [https://perma.cc/UE5L-4TNA].

133. *Id.*

134. *About BeefChain*, BEEFCHAIN BLOCKCHAIN: VERIFIED BEEF & SHEEP, https://beefchain.com/about/ [https://perma.cc/P9XM-9UZ6].

135. *Id.*

136. *See* Kenneth W. Abbott, Robert O. Keohane, Andrew Moravcsik, Anne-Marie Slaughter & Duncan Snidal, *The Concept of Legalization*, 54 INT'L ORG. 401, 401–02 (2000).

137. Julia Black, *Decentring Regulation: Understanding the Role of Regulation and Self-Regulation in a 'Post-Regulatory' World*, 54 CURRENT LEGAL PROBS. 103, 105–12 (2001); *see also* David Vogel, *The Private Regulation of Global Corporate Conduct: Strengths and Limitations*, 49 BUS. & SOC. 68, 69–70 (2010).

138. *Hard Law/Soft Law*, EUR. CTR. FOR CONST. & HUM. RTS., https://www.ecchr.eu/en/glossary/hard-law-soft-law/ [https://perma.cc/N7W3-QN9X].

Though Blockchain was created in 1991, it was not used until 2008 as a vital part of cryptocurrency. As an emerging technology then, Blockchain faces an uncertain future. Thus, soft law approaches provide critical benefits of experimenting and learning through voluntary oversight programs.[139] Moreover, these voluntary oversight programs may also ease the tension between federal and state-level governance, which will ultimately keep control within the industry.[140]

Retaining control within the industry is valuable because it can prevent problems similar to those that surfaced with the DSCSA. One considered result of power escaping the prescription drug industry was a federal act preempting state law. Federal regulators, such as the FDA, FSIS, and CDC, already facilitate food industry action on traceability without actually having any formal regulatory power. Thus, soft law can prevent preemption problems by not requiring or binding states to comply with federal regulations and ultimately giving states more flexibility to implement effective, emerging technologies like blockchain into essential areas such as the agricultural supply chain.

CONCLUSION

Since the emergence of blockchain technology, its applicable uses are rapidly expanding past its most popular use in cryptocurrency. Blockchain is slowly being integrated through pilot programs in areas such as the food industry and, more specifically, the agricultural industry.[141] The rapid adoption of new technologies will always present problems for regulatory bodies that are unable to adapt at the same pace. However, through organizing publicly held meetings, such as the "New Era for Smarter Food Safety," regulatory agencies like the FDA learn valuable information that they can implement to make changes. Complete implementation of a blockchain requirement will by no means create a solution to all the tracking and tracing problems currently challenging the agricultural industry. However, blockchain provides a promising start to a new digital era within the industry.

Moving forward, soft law methodology will be vital in regulating blockchain technology because it functions as a convenient way to keep control within the agricultural industry. Retaining control within the agricultural industry becomes increasingly important when trying to establish some type of standardization. With multiple, external regulatory agencies controlling different parts of the agricultural supply chain, one

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139. Kenneth W. Abbott, Gary E. Marchant & Elizabeth A. Corley, *Soft Law Oversight Mechanisms for Nanotechnology*, 52 JURIMETRICS J. 279, 298–300 (2017).

140. *Id.*

141. *See infra* Part III and sources cited therein.

agency often tells customers something different than another agency, thereby creating customer confusion. If blockchain is fully implemented into the agricultural supply chain, the answer to whether federal law will preempt state law remains unknown. Nonetheless, the agricultural industry is due for a change and blockchain should be the start of a much-needed new digital era.