

# Arbeidsnotat

## Working Paper

**2020:5**

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The role of blockchain in green  
supplier selection process :  
an insight from the Norwegian  
shipbuilding industry



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## **Introduction**

At the end of 1990 scholars started to discuss environmental conscious business practices and the role of supplier environmental performance (Sarkis, 1998). Supplier assessment refers to the practices of supplier monitoring, evaluation and selection, including the code of conduct or various environmental (or social) criteria to control the sustainability-related risk along the supply chain (Ni & Sun, 2018). Trust between supply chain partners has been identified as a fundamental factor for collaboration mechanisms (Galaskiewicz, 2011; Touboulic & Walker, 2015). Greater interaction between firms might improve the information sharing flow and enhance transparency. It might be challenging to capture the information of suppliers environmental performance, consequently, select the right supplier and rely on overall characteristics of supplied goods and services. For that reason, it is crucial to develop a common framework to integrate environmental sustainability evaluation within supply chain networks.

According to Sarkis, Zhu, and Lai (2011b) social network theory (SNT) takes into consideration organizational outcomes that derive from the social relationship between the companies. From the perspective of environmental sustainability, SNT assists in investigating information sharing, joint efforts for the development of environmentally-friendly products and processes, improving buyer-supplier relationships and performance outcomes. Seeking a way to enable or improve greening of the supply chain, therefore, seems pertinent, and in addition to this, it is interesting to find a model for implementation that will help companies to do so with ease.

The supplier selection process following the environmental and social performance is a complex process that requires transparency across suppliers behaviour. Rane and Thakker (2019) suggest that the green procurement process when combined with blockchain and IoT architecture helps not only in energy and waste minimization, but also ensures that the suppliers and consumers are well connected in the supply chain. The information shared through blockchain allows companies to help their suppliers in choosing their vendors (Kouhizadeh, M., & Sarkis, J. (2018). The literature offers various approaches to supplier evaluation. One of them is carbon footprint produced by suppliers, which can be used for evaluation on how to reduce the overall emission in production and along the life cycle of the product. Liu, Chang. Huang and Lu (2019) propose a framework of the integration of Carbon Footprint and Blockchain that covers calculation layer aiming at data collection on carbon footprint, which can be supported by Internet of Things (IoT) technology application,

blockchain layer and integration layer. While some of the MNCs already consider blockchain as a tool for a better overview of suppliers' environmental and ethical compliances, the research literature is still at an early stage of providing a comprehensive understanding of the role of blockchain technology in the supplier evaluation process. Furthermore, the research is needed to illustrate more case studies of companies that consider application of blockchain technology in supply chain operations (van Hoek, 2019).

This leads us to formulate the research question:

*How can blockchain technology affect green supplier selection process?*

Specific objectives of the research are as follows:

- to define scope and metrics for environmental performance evaluation of suppliers
- to examine how blockchain can facilitate a green supplier selection process
- to evaluate potential barriers for blockchain technology implementation
- to define potential opportunities for blockchain technology adoption

### **Research Design/Methodology**

The research paper includes two sections: systematic literature review and a case study of Norwegian shipbuilding industry.

#### **Systematic Literature Review**

In this section we explore relevant literature in green supplier selection and blockchain technology published lately (2015 -2020). We assimilate and marry the literatures together in an attempt to identify the role blockchain technology can play on green supplier selection. We join the ongoing discussion in the extant literature and situate our research on the applicability of blockchain technology in a selected case industry in Norway.

An exploratory literature search seems pertinent to first find out if there is any literature gap, and there is also an argument for investigating current literature to see if it will fit with local or regional production practices in the shipbuilding industry, and perhaps to find if there are areas within this industry that have been little explored.

## **Case Study of Norwegian Shipbuilding Industry**

With this study we seek to explore the adoption of green supplier selection process in the selected Norwegian Shipbuilding Industry which bears yet an unveiled innovative technologies such as blockchain. We seek to identify the potential application of blockchain technological functionalities in the areas such as supplier authentication and audit trail in respect of their engagement with green requirements in its processes. In accordance with the purpose and research question in this study, we opt for a qualitative, explorative case study approach to uncover the role blockchain technology may play in the supplier selection process.

Creating a comprehensive overview of how the company views the challenges in the greening of their supply chain is a goal, including economic aspects, mitigating economic challenges, foreseeing environmental benefits and mapping these for future comparison. In this, finding available literature covering this case and investigating which literature is comprehensive enough to fully solve the challenges ahead is a major point. So is using the result to find what a paper must contain to close the literature gap (if there is one). This should make the grounds for deciding what the paper should include, helping to form it to fit with the specific industry if necessary.

## **Expected Findings from the Case study of Norwegian Shipbuilding Industry**

In finding ways of implementing a blockchain solution with the company's current strategy one is sure to meet with challenges and pain points for the focal company to be mitigated, and this will be addressed. Changing the focal company's supply chain could be necessary and so there is a point here to address a way to change their supply chain strategy to fit with blockchain implementation.

Supply chain contributors may need motivation, and in this, it seems pertinent to consider the company's standing in the industry, as well as its influence in the industry. Investigating their supply chain partner's incentives to participate is also interesting. The resulting information would help suggest a methodology going forward, as well as finding a methodology that is optimal for the company and the supply chain as a whole. If necessary, creating a new methodology acceptable for all parties could be necessary.

### **Contribution to Theory and Practice**

The paper aims at contributing to the role of social network theory in facilitating transparency and information exchange among supply chain actors. Furthermore, it seeks for better understanding of technology and digitalisation in green supplier selection process.

Better yet, this research offers an indispensable insight for supply chain practitioners for the potential role of technology in green supplier selection. Moreover, it aims at shedding light on the understanding of the potential challenges for blockchain technology adoption as well as the potential benefits for blockchain technology in green supplier evaluation process.

### **Research Limitations and Directions for Future Research**

This study is limited to one industry (shipbuilding) in one specific region. The recommendations and conclusions should be validated in further studies. Including more industries in different regions might produce better insight in this area. Besides, a comparative study for another industry and/or another industry should give new insight into the differences within this field both related to different industries and related to regional differences.

### **Originality of Study**

Green supplier selection is considered as a very important and primary step of achieving sustainable supply chain management. This is due to an ever-increasing environmental and social awareness that pervades the supply chain realm. Despite its recent emergence, it augments conventional supplier selection criteria whose main focus has been particularly on cost, quality, and delivery among other criteria by incorporating environmental aspects in the supplier selection criteria. Research abounds the application of methods like Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), Linear Programming (LP), Data Envelopment Analysis (DEA) among others (Nielsen et al., 2014) in green supplier selection. This study proposes a way of evaluating whether BCT can be used as an alternative approach to green supplier selection in the shipbuilding industry. This may avoid accidental inclusion of ill-suited suppliers based on incomplete information (change of status of suppliers over a period of time)

This paper supports UN sustainable development goal 12 “which stresses on ensuring sustainable consumption and production patterns”. It seeks to develop a framework that will ensure focal firms trade with those suppliers that have implemented green strategy in their production and management processes to reduce environmental impact.

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**Molde University College**  
Specialized University in Logistics

**HiMolde PhD**

## **DRL028 Blockchain Applications in SCM**

**Credits: 5 ECTS**

**Time: Week 49, 30 November to 4 December 2020**

Supply chains drives the macro economy and global markets. The push towards digitalization and sustainability have intensified the need for interoperability among organisations. Blockchain technologies facilitate coordination of spatially dispersed complex tasks at a low cost. This PhD-course present current research on blockchain applications in supply chains, and offer an opportunity to discuss future applications and research on information sharing in extended supply chains.

### **Monday 30 November**

- Welcome & introduction (By Bjorn, Arvind and Svein)
- Present group work as a Blockchain-SCM Project (Arvind)
- Students presents themselves
- Blockchain technology and SCM (Lecture by Nitin)

### **Tuesday 1 December**

- Paper review & discussion
- Blockchain-SCM Project: Group forming & project ideas
- Blockchain technology and SCM (Lecture by Nitin)

### **Wednesday 2 December**

- Paper review & discussion
- Blockchain-SCM Project: Identify research focus, gap identification & research method

### **Thursday 3 December**

- Lecturer work/research on Blockchain in SCM (Bjorn, Arvind, Svein)
- Paper review & discussion
- Blockchain-SCM Project: Data collection / experimental setup

### **Friday 4 December**

- Blockchain-SCM Project: Group A paper draft presentation
- Blockchain-SCM Project: Group B paper draft presentation
- Blockchain-SCM Project: Group C paper draft presentation
- Summing up

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