Exploring the Impact of Blockchain Technology in the Energy Industry

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Background

- The 21st-century global economy is exhibiting an unprecedented rate of change due to rapid technology and societal development. The growing trend of digitization of many business activities leads to the increased costs reduction associated with storing, processing and transmission of data.

- In recent years, blockchain is increasingly considered as one of the most innovative and promising technologies to help organizations identify, acquire, and sustain competitive advantages (Jović et al., 2019).

Background

- Blockchain Technology - the new mode to realize and manage transaction processing through transparent and trustworthy rules, to construct non-forgeable, non-tampering and traceable data structure in peer-to-peer (P2P) network environment.

- It is a new application mode combining computer technologies, distributed data storage, consensus mechanisms, P2P transmission, and encryption algorithms.

Background

- The biggest innovation of blockchain is that transactions are no longer stored in the central database but are distributed to all participants in the supply chains.

- This will help organizations to achieve better communication, informational and financial security, time and waste reduction, quality, and service improvement, and eventually enhance business performance (Queiroz et al, 2019; Dubey et al., 2020).

Challenges

- According to Deloitte's global blockchain survey (2019):

  61% of responding companies believe that "blockchain is only a monetary database and a financial service application";

  72% believe that blockchain will have a big impact on the industry in the next decade;

  only 15% of respondents have been applied blockchain to practice.

- Blockchain's industrial application has only begun to be discussed and explored in the past few years, indicating that the understanding of blockchain technology is still in its infancy (Borowski, 2021; Teufel et al, 2019).

The Energy Industry

- The oil and gas supply chain is highly complex, suggesting assimilation of various organizations and business activities including coordinating materials, information and financial flows for satisfying demands.

- The primary needs from oil and gas companies tend to be strategic and unstructured in general with more requirements in the areas of intra- and inter-firm collaboration and diffusion of best practices of **Blockchain technologies and data analytics**.

The Energy Industry

- With all such potentials, research shows that the use of Blockchain technology in the oil and gas industry is still at an experimental level with only a handful of companies (e.g., Chevron and Shell) have been trying to explore Blockchain technologies (Mohammadpoor and Torabi, 2019; Borowski, 2021).

- Academically, there is a limited number of research studies that have examined the result of business performance through managing the oil and gas supply chains using Blockchain, especially from an empirical perspective (Andoni et al, 2019; Nguyen et al., 2020).

Research Goals

- This study seeks to explore how the alignment between blockchain technology and oil and gas supply chain management (SCM) could impact business performance.

- The results rendered in this research will underscore the importance of SCM, but also the critical role of blockchain that could have positive impact in the oil and gas industry.

Research Questions

- Specifically, we attempt to fill the void in the literature by:

- a) focusing on blockchain's application potential in management and decision making in oil and gas companies and their supply chains, where current real time data is hard to fetch and information is stored in an independent manner;

- b) addressing challenges including technological, regulatory, and system transformation, that affect the adoption and impact of blockchain in energy companies; and

- c) discovering opportunities brought by blockchain and how organizations could realize such chances to enhance business performance (reducing transaction costs and improving transparency and efficiency).

Methodology

- A research survey will be developed to collect real-life industrial data in the oil and gas industry.

- The survey instrument will contain research questions aiming to gather oil and gas companies' facts and practices in blockchain technologies, big data analytics capability, supply chain management, and firm performance.

Methodology

- Partial Least Square-Structural Equation Modelling (PLS-SEM) method will be used to analyze the oil and gas blockchain data model and to test the research hypotheses.

- SmartPLS will be used to test and analyze the measurement model and the structural model.

- The PLS is a preferred methodology if the research objective is theory development and prediction, as is the purpose of this study (Hair et al, 2011).

Proposed Model
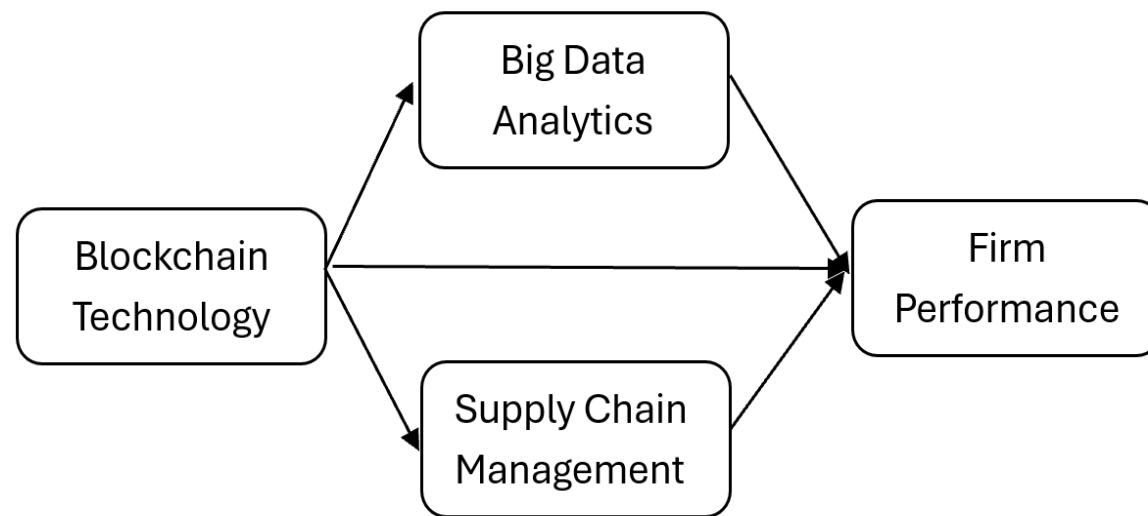
- H1: Blockchain technology is positively associated with big data analytics capability.

- H2: Blockchain technology is positively associated with supply chain management.

- H3: Blockchain technology is positively associated with firm performance.

- H4: Big data analytics is positively associated with firm performance.

- H5: Supply chain management is positively associated with firm performance.

Next Steps

- Distribute research survey to target firms in the energy industry

- Collect data and conduct data analysis

- Test research hypotheses

Thank you

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