# DRIVERS AND BARRIERS OF BLOCKCHAIN USE IN THE DUTCH PORK MEAT SUPPLY CHAIN

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## I. INTRODUCTION

The food supply chain has become more complex, making it increasingly difficult to determine where a specific product comes from and how it has been produced [1]. For example, Dutch consumers indicated the desire to know more about the origin of the pigs, especially their welfare and health [2]. However, it is difficult to guarantee these claims as the transparency within the Dutch pork meat supply chain is lacking [2]. Even with strict legislation about providing transparency in the food supply chain and mandatory traceability systems in Europe, it is impossible to fully guarantee consumers these desires [3]. Blockchain technology (BCT) is regarded as a promising technology that might solve these issues. BCT appeared for the first time in 2008 and is a type of database that contains an immutable digital recording of the history without the need of intermediaries [5]. The food industry has witnessed some of the earliest initiatives to implement BCT in supply chains [4]. This study explores the acceptance of blockchain use in the Dutch pork meat supply chain by focusing on current collaboration practices along the supply chain, with particular emphasis on the market devices used to ensure traceability, and the credibility of these devices. Secondly, the study explores the drivers and barriers for introducing BCT according to actors along the supply chain (farmers, slaughterhouses, meat processors and retailers).

## II. MATERIALS AND METHODS

A literature review was conducted to identify the factors that determine the acceptance of BCT in the food supply chain. To validate the findings of the literature review, semi-structured interviews were conducted with pork supply chain actors (breeders, farmers, slaughterhouses, processors and retailers) located in The Netherlands from January to February 2023. The interviews revolved around two topics: the currently used market devices and potential barriers and prospects of adopting BCT in the Dutch pork meat supply chain. Each interview took about 1 hour and was conducted online via Microsoft Teams. Data was analyzed by performing a thematic content analysis using Atlas.ti (version 22.2.3) to organize, code and assist in analysing the qualitative data.

## III. RESULTS AND DISCUSSION

This study aimed to validate the literature findings that determine the acceptance of blockchain use in the Dutch pork meat supply chain. The validated market devices were the traditional traceability systems, blockchain-based traceability systems, ear tags, tattoos, RFID, DNA tracing techniques, and barcodes. The credibility of blockchain-based traceability was rated high by most of its users. However, not all supply chain actors agreed with this as they have doubts about the technology. Moreover, the credibility of ear tags was considered low as they could easily get lost. Tattoos were considered credible when compared to ear tags. However, it was mentioned that these tattoos could also be compromised by fading. Furthermore, the drivers and barriers for introducing BCT were also explored. In total, seven drivers and seven barriers were validated. Also, one new driver and four barriers were added which emerged from the interviews with the experts as depicted in Table 1.

Table 1 Validated and newly added drivers and barriers as emerged from the interviews with the experts.

| **Validated drivers** | **Validated barriers** |
|---|---|
| Traceability | Lack of knowledge and expertise |
| Transparency | Privacy dilemma |
| Efficiency | Supply chain readiness |
| Sustainability | Scalability |
| Combatting food fraud | Inaccurate inputs |
| Reducing costs | Blockchain suitability |
| Pressure from others* | High implementation cost |
| **New driver(s)** | **New barrier(s)** |
| Interoperability | Fragmentation of the Dutch pig sector |
| | Communication with farmers |
| | Damaging business relationships |
| | Energy consuming |

*Such as, consumers, suppliers or the government.

The driver 'Interoperability' was added as a new driver. In The Netherlands, many different information systems are used, which makes it challenging to exchange data. Some supply chain actors stated that implementing BCT in the whole supply chain could lead to faster and easier exchange of data. Furthermore, four new barriers emerged from the interviews. The 'Fragmentation of the Dutch pig sector' was often mentioned by the supply chain actors as a barrier and is closely related to the newly added driver. Currently, it would be challenging to get all actors to use the same system, as the various chain actors are in most cases satisfied with their own system.

## IV. CONCLUSION

The scope of this research is broad as it covers all the key chain actors of the pork meat supply chain which is more of a holistic approach. The findings can also be extrapolated to other meat supply chains. It was found that in general all chain actors in the Dutch pork supply chain were satisfied with their currently used market devices and more barriers than drivers were validated which likely indicates the hesitation on the adoption and implementation of BCT within the Dutch pork meat supply chain. It is advised to focus on addressing these barriers if implementation were to be met in the future.

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