Exploring the applicability of digital freight matching for agile agri-food supply chains: insights from retail industry.

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Abstract
For the past few years, agri-food supply chains have shown numerous sources of vulnerability especially when it comes to distribution and retailing. This state of affairs has been accentuated by the health crisis of Covid-19 which has revealed the significance of a supply chain agility and responsiveness in such critical periods. Moreover, due to the sensitivity of the cold chain regarding the perishable nature of goods, time-consuming global exports supply chains may lead to severe risks of goods waste, shipment delays, hence market share loss. In addition, with the increase in logistics activities outsourcing, designating the right logistics provider PL is of paramount importance for the success of every value chain. Therefore, the recourse to new information technologies and digital platforms become a necessity for executives and policymakers to withstand global disruptions and achieve better service quality. In this study the authors investigate the potential contributions of digital freight matching (DFM) platforms on firms’ agility and responsiveness in Moroccan retail industry considering that such blockchain or AI based technology offers assistance regarding supply chain agility by improving capabilities to cope with market fluctuations. That is to say, the aim of this study is to scrutinize the influence of web-based technologies such as DFM in solving shipment and deliveries problems by ensuring visibility and traceability from quoting through delivery. For that, we conduct exploratory research using Gioia methodology among retailers in the Moroccan agrifood context through which we provide insights to researchers but for managers as well on the contributions on digital platforms in enhancing downstream logistics and operations management performance.

Key words: Agrifood supply chain, agility, digital freight matching, supply chain responsiveness, retailing.

1. Introduction
Sustainability, digitization, food safety, and the pressing need for more effective agri-food supply chains are just a few of the many difficulties facing the agricultural sector. Moreover, the Supply Chain organization’s ability to manage outbound logistics has traditionally been its forte (Chatur, 2006). Therefore, the distribution function especially transportation which is the glue that associate activities to each other, has been the focus of logistics, particularly in the industrial environment. However, the complexity of supply chains and the multiplication in relations between partners have made the chain several flows delicate to manage. This state of affairs has been the results of the genesis of sharing economy and the increase in outsourcing of logistics activities most specifically when it comes to managing downstream logistics. Nevertheless, the traditional freight shipping model is still built on insufficient and slow process and system which has shown a source of vulnerability in critical situations. In this regard, the recourse to digital platforms driven by industry 4.0 technologies represents a considerable opportunity to enhance supply chain agility and develop a competitive advantage. Digital platforms such as DFM provides smoothness and speed in transactions between demand consisting in the ability of consumer to match and products and prices, and supply by recommending the adequate transaction partners [1]. That is to say, emerging platform-based logistics business can by identifying providers for carriers or forwarders to take into account for the actual extent of service agreements with clients, promote competitive business. A market- and technology-oriented approach on digital platforms is recommended to expand on design and governance issues within a particular industrial environment as a result of the significant contributions of technological platforms and ecosystems [2], [3]. As such, the main objective of this research is to study the contributions and mechanisms of DFM for retailers in the agri-food industry.

The following of the paper is organized as follows: in section 2, we shed light on the applicability of DFM in logistics and transportation through the previous researches and studies conducted. Section 3 is reserved to presenting the adopted methodology for the data collection and analysis. Afterward, we discuss the outcomes and results generated from the analysis in
section 4. Finally, the last section exhibits the main conclusions that our study has revealed.

2. Literature review

2.1. Digital freight matching in freight logistics

The expansion which the business world is witnessing has escalated the magnitude of flows especially information ones that companies has to deal with each day. Furthermore, the increase in partnership strategies has generated "crossed chains" and it can’t be detected where the products consumption ends. Freight brokers or forwarders plays therefore a significant role in freight transportation as they represent the hub of communication and transactions during the entire logistics process.

As such, the logistics and transportation business is increasingly oriented toward innovative information systems (IS) as catalyst for operations processes effectiveness [4]. The emergence of technological platforms for instance has paved the way for logistics business and retailers to provide better service opportunities, especially in freight sector with all its categories (road, see, air). However, the most perceived industry of digital technologies implementation is that of agri-food sector which face a several constraints and challenges, inter alia, the customer increasing expectations, the need for food safety and sustainability and the urge for more supply chain agility and efficiency. The cold chain being so fragile as it handles perishable products, products that need control, monitoring cautious and strategic handling procedures all along the value chain has to be underpinned on a solid and flexible logistics and transportation system. Along these lines fit the contributions of DFM due to the fact that such digital platforms have numerous assets including facilitating information exchange by commoditizing logistics services based on cutting-edge algorithms [5], enabling freight capacity utilization through matchmaking demand and supply [6], and supporting transport planning through the automated booking of shipments [7]. Applications for digital freight matching primarily make use of the benefits in information that the internet and mobile technologies offer. As electronic markets between shippers, freight forwarders, and carriers [8], DPs are essentially multisided platforms in the road freight transport domain [9]. In other words, via web or mobile based brokers (platforms), shippers can see transparent pricing and get real-time quotes, and carriers can simplify the load-searching process and get fast payments, hence, improving all parties’ effectiveness (Armstrong & Associates, Inc., 2016). The principle of DFM is that shippers and freight brokers publish loads on loadboards. They are available online, through a mobile app for a Loadboard, and at truck stops. Trucking businesses, fleets, owner-operators, and freight brokers all use loadboards. When there are more loads advertised than trucks available, carriers will get in touch with the broker who posted the load to negotiate rates and finalize the job (Figure1).

Simply put, the expansion use of advanced technologies such Blockchain and artificial intelligence on which is based digital platforms, provides a new level of visibility and trust in the supply chains which is of paramount significance for efficiency, resilience and sustainability [10]–[12]. Table 1 exhibits existing literature which support digital driven freight transportation.

**Figure1:** Freight logistics using DFM
3. Methodology and data analysis

To study the interplay between DFM application and agri-food supply chain agility, this research study adopts an inductive qualitative approach using Gioia methodology [19]. This approach will allow us to structure our data into three levels “first-order concepts, second-order themes, and third-order aggregate dimensions”. Since we are performing an exploratory study, data sources are crucial and of paramount importance for the investigation. As such, data triangulation was included and three sources of data are used in this study, including participant observation, semi-structured interviews as primary sources, and secondary sources including company websites, reports, publications, and documents [20]. This variety of sources is significant for the study strength and reliability by combining the method and the data to validate the same results [21], [22].

4. Findings and discussion

Results are presented in this section on three different levels: efficiency, agility and responsiveness, and profitability. These three levels were determined by us based on earlier study [14], [23], [24].

4.1. Efficiency

Underutilized capacity

Enhancing efficiency and solving issues in agri-food supply chain has become more and more complex and difficult to achieve due to the globalization in food industry which also expands the number of participants, slows down the transit of perishable goods, and amplifies information fluctuations in supply chains. Therefore, most of the time, pick-up delivery vehicles return empty to the original terminal after the distribution of the goods.

DFM platforms come therefore to answer these inefficiencies and problems. For instance, the benefits of these platforms reside in reducing empty miles which constitute one of the main sources of wastage. To avoid empty miles, matching systems offered by DFM give to freight carriers to take advantage of the unutilized capacity of their either ships or trucks and fulfill more orders for goods delivery. Hence, optimizing resources usage and efficiency and enhancing distribution supply chain performance. As such, decreasing and filling underutilized capacity will be beneficial for both carriers and shippers.
Transactional processes

To horizontal collaboration achievement, DFM platforms provide a combination of online payment, automatic continuously monitor-and-trace, document management, single pricing interactions, and algorithmic pricing. This stat of affairs will assist organizations in responding rapidly to sudden orders and maintaining superior quality though the quick sharing of information documentation and payment.

4.2. Agility and responsiveness

The instability that business world has witnessed lately has exposed the fragility and vulnerability of agri-food supply chain facing demand fluctuations and disruptions. As such, via digital dispatch/load alerts to drivers, immediate booking, and in-app communication tools, DFM apps can enhance reactive and responsiveness capabilities of adapting rapidly and providing speedy responses to sudden changes in demand, to gain competitive advantages. Furthermore, DFM platforms provide an enhanced visibility through tracking services and online data sharing for vehicle and driver, shipment, load, freight rate, and document. In other words, improved supply chain visibility will provide firms with high quality data, hence, enables firms to fulfil orders and respond to market developments in real-time, ensuring on-time product delivery, reducing demand uncertainty.

4.3. Profitability

Organizational performance

As far as firms’ profitability is concerned, the improvement in service quality through real-time deliveries enhances consumers trust and authenticity as to the origin and perceived quality of the product. Consequently, companies can gain new market shares which will increase their revenues and profits through higher sales and premium pricing.

<table>
<thead>
<tr>
<th>First order concepts</th>
<th>Second order themes</th>
<th>Aggregate dimensions</th>
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<tbody>
<tr>
<td>Transportation costs, inventory costs, continuously monitor-and-trace, resources utilization, communication.</td>
<td>Underutilized capacity, Transactional processes</td>
<td>Supply chain efficiency</td>
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Supply chain visibility
Logistics process flexibility
Market and business shares, financial performance, customer satisfaction, annual sales growth, competitive position.
Organizational performance
Supply chain profitability

5. Conclusion

The agri-food supply chain has been facing a set of disruption waves in the last period. This state of affairs has paralyzed and weakened firms logistics process especially transportation systems which affected massively operational performance of agri-food organization. In this regard, industry 4.0 technologies such as digital platforms are introduced to agri-food industry as a significant catalyst aiming to foster supply chain agility and responsiveness. The latter is compulsory in supply chain short term processes and become more robust in the long run. In this research, we analyze the adoption of DFM platforms and its contributions in improving resilience and robustness of agri-food supply chain. For the analysis, we focused on three important aspects of agile supply chains: efficiency, agility and responsiveness and profitability, in order to examine the role of DFM in redesigning the traditional distribution and transportation processes. The findings revealed that DFM increases transparency and visibility through real-time informations which enables firms to react quickly and adapt rapidly to sudden changes. Furthermore, the advantages that these platforms provide including online payment, load and price matching and especially disintermediation, will lead to costs saving and optimization in resources utilization and customers’ requirements and subsequently improving supply chain efficiency and profitability.
References


