Editorial

Platform Service Supply Chain Management: Challenges and Solutions

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Service platforms have been developed greatly in the last several decades. Empowered with the latest development in information and communication technologies and the associated tools including Big Data Analytics, these platforms aim to minimize the number of intermediaries and maximize the efficiencies in their service supply chains.

The continuous development of platform service supply chains (PSSC) and their member firms is not without challenges. From the economic perspective, PSSCs need to continue to improve or optimize their operational and strategic decisions including production, pricing, and collaboration. This is not easy as customer expectations are getting higher. From the perspective of social responsibility, PSSCs need to ensure consumers' safety and thus privacy are properly protected. When making decisions, PSSCs should consider not only profitability, but also consumer surplus and social welfare. Finally, from the perspective of environmental protection in particular, PSSCs should aim to minimize the waste generated from their business activities. Two examples of such waste are the single-use items such as plastic containers and utensils from the online delivery platforms and the "cycling cemeteries" from the bike-sharing platforms.

This special issue of the International Journal of Production Economics intends to provide a forum to share new and significant results on the challenges and solutions in platform Service Supply Chain Management. With a large number of submissions, we accepted 26 papers for this timely topic. For simplicity, these papers are categorized below based on their focus on economic, social responsibility, or environmental protection perspectives.

Platform Service Supply Chain Management from the Economic Perspective

Mobile app developers often distribute their apps through platforms such as Google Play. Between them, they can adopt a consignment contract with revenue sharing. Avinadav et al. (2022) examine such interactions between a mobile app developer and a platform. They focus on whether these two firms should share their private information about the uncertain demand of the app. They show that the platform benefits from sharing its demand information with the developer.

Bai et al. (2021) explores blockchain platform selection and adoption decision making in a multiorganizational supply chain context. They propose a decision support framework to jointly select blockchain service vendors (e.g., IBM and Oracle) and platforms (e.g., Hyperledger and Ethereum). This framework is based on social network relationships from the multiple perspectives of users, vendors, and platforms.

Charpin et al. (2021) study the adoption of mobile procurement platforms in China's restaurant industry. Their main objective is to reveal the enablers and barriers to the use of such platforms and propose solutions to minimize these barriers. Their results confirm that a mobile procurement platform is not a panacea to every organization. To minimize the barriers to its adoption, business developers need to implement practices to bring the online and offline consumers.

Chaudhuri et al. (2021) model a platform of manufacturing-as-a-service (MaaS) which connects a network of manufacturers with their customers. Their models are motivated by a real-life MaaS platform and validated with its data. In this research, they investigate the platform's optimal pricing strategies to maximize its own profit as well the joint profit of itself and its manufacturers. Overall, pricing strategies have been introduced for MaaS platforms achieving economic sustainability by attracting sufficient number of manufacturers and consumers.

He et al. (2022) consider a supply chain where a manufacturer sells through an e-commerce platform with a possible third-party logistics service provider (3PL). They analyze the joint decisions of the manufacturer's channel encroachment and the platform's logistics integration. If the manufacturer encroaches, the platform can choose between partial logistics integration and complete logistics integration. Interestingly, they show that partial logistics integration may be better for the manufacturer and the entire supply chain, but not the platform. They then propose schemes to achieve supply chain coordination.

He et al. (2021) examine an on-demand service platform such as Didi and Uber where customers hold private information about their horizontal preferences (i.e., flexibility) and willingness to wait (i.e., delay sensitivity). With the objective of maximizing the platform's revenue, they develop incentive contracts related to steady-state scheduling rules, probabilistic routing policies, binary admission controls, and pricing strategies. In particular, they prove that if the horizontal preference is observable, the platform should pay information rent to patient customers. However, rent is unneeded if the delay sensitivity is observable.

Hong at al. (2021) explore the critical success factors for adopting supply chain service platforms in catering SMEs in China. With survey data from 228 Chinese catering organizations, they empirically verify that these critical factors include organizational resource and external pressure, and the perceived platform value is a mediating variable.

Li et al. (2021b) examines an O2O supply chain where a manufacturer sells to customers through a platform with online consumer reviews. Contrary to earlier studies, they explore the potentially negative impacts of these review in the presence of intra-brand competition when a new product is introduced. They find that the consumer reviews can exhibit an increased-sales effect in the

incumbent product. Overall, their research makes a major contribution by exploring the interactions among product pricing, new product design, and online consumer reviews.

In many online service outsourcing platforms like Upwork and Freelancer, clients can procure services from freelancers. Li et al. (2021c) investigate a freelancer's potential participation in skill certification before bidding in a client-determined reverse auction. More specifically, they investigate the interactions among the freelancer's certification, bidding, and service effort decisions and the client's design of the outsourcing contract. Their research reveals the critical roles of certification informativeness and transaction efficiency. For example, for the platform, the value of the certification system increases with the certification informativeness.

Lin et al. (2021) focus on the logistics sector in China and ask the following question: How to sustainably develop and manage a platform service supply chain in the logistics sector? They also jointly consider a platform and its business ecosystem. To achieve the sustainable development of a platform service supply chain, they identify multiple critical elements including mutual facilitation, strategic alignment, and dynamic configuration.

Shi et al. (2021) examine a stylized supply chain where a manufacturer sells to a retailer. Differing from the literature, they consider the possibilities that each firm may or may not sell online by joining an online marketplace platform. They show that the firms can benefit from the platform only with a low degree of competition among different channels. They also investigate the role of platform fee when it is exogenous or endogenous.

Xie et al. (2021) investigate platform competition under four possible platform service supply chain structures: buyers single-homing and sellers partially multi-homing (SH–MH), buyers partially multi-homing and sellers single-homing (MH–SH), both sides single-homing (SH–SH), and both sides partially multi-homing (MH–MH). Based on a Hotelling model, they consider buyers' same-side network effects and both buyers' and sellers' cross-side network effects. They derive several results and managerial insights on two-sided pricing, market share, and platform profit in equilibrium.

Using data from Meituan, a major on-demand service platform in China, Yan et al. (2021) empirically examine the determinants of consumer complaints about the platform and its merchants. They show that when a service failure occurs, consumers may or may not the appropriate attribution of their complaints about the platform or its merchant. Moreover, consumer complaints are affected by whether a merchant is a chain store or not. Overall, this research provides managerial implications on how a platform and its merchants can manage consumer complaints.

Ye et al. (2021) examine how a platform-based sharing firm (e.g., Uber and Lyft) compete with the manufacturer of its shared product (e.g., car manufacturers). As shared products are usually durable, they build two-period game theoretical models. In the first period, the manufacturer may price its products aiming to an owner base. In the second period, the manufacturer directly

competes with the platform for consumers. Their results reveal how the owner base and the sharing utility affect the profitability of the two firms.

Yeo et al. (2021) explore the potential determinants for customer repurchase intention in online food delivery platforms. They obtain data from Foodpanda, a successful platform in Malaysia. Their empirical results show that perceived usefulness, social influence, and trust significantly and positively influence customer repurchase intention.

Zhang et al. (2021b) analyze a stylized supply chain where a manufacturer sells to customers via a platform. In this setting, the manufacturer decides whether to encroach and the platform decides on retail service investment. By analyzing several game theoretical models, they show that either firm can benefit from manufacturer encroachment and the platform's service investment. In particular, they argue that the platform may invest in retail service aiming to incentivize the manufacturer to encroach.

Zhen et al. (2021) focus on last-mile city delivery for parcel service platforms. They evaluate six crowdsourcing models: grabbing mode, assignment mode, two tasks assignment mode, bonus mode, task cancellation mode, and mixed bonus-cancellation mode. Considering several realistic factors such as latest service time, task cancellation rate, and range distribution of tasks, their results provide guidance on how to select a crowdsourcing model.

Zhou et al. (2021) explore the emergence of fourth-party platforms, which allow consumers to compare and use multiple competing third-party platforms. A case in point is a Chinese platform called Amap, which integrates ride-hailing platforms such as Didi and Shenzhou. From the perspectives of profit, consumer surplus and social welfare, they aim to answer the question: should a third-party platform join a fourth-party platform? Employing the Hotelling model and the Pyramid Spatial model, their results reveal the importance of setting appropriate commission rates.

Platform Service Supply Chain Management from the Social Responsibility Perspective

Kong et al. (2021) study the challenges due to highly imbalanced and fluctuating supply and demand faced by on-demand logistics platforms such as Uber and Meituan: inefficient resource allocation, high costs, and top-down centralized decision-making process. To help overcome these challenges in metropolitan settings, they propose an online double auction for on-demand pickup and delivery. Their proposed auction aims to maximize the social welfare and minimize transaction failures. They confirm that online double auction can improve transaction efficiency and transportation sustainability for imbalanced and fluctuating supply and demand.

Li et al. (2021a) compare the impacts of two cancellation penalty schemes (time-based fee or fixed fee) on the performance of a car hailing platform such as Uber and Didi. They find that to maximize social welfare, the penalty fee should equal the car driver's cost due to order cancellation. Furthermore, the fix-fee scheme can generate more users when the number of cars is limited. However, time-based scheme is more likely to maximize social welfare.

Liu et al. (2021) explore a potential dark side in platform service supply chains: the big data discriminatory pricing (BDDP) behavior. To this end, they build and evolutionary game model involving three parties: a service platform, consumers, and the government. The equilibrium results show that in the absence of governmental supervision, the government should set a high tax rate if the platform is risk neutral. If the platform is risk averse, the optimal tax rate can be high or low depending on the risk-aversion level. On the other hand, in the presence of governmental supervision, the government can set an appropriate penalty level which decreases in the risk-aversion level.

Platform Service Supply Chain Management from the Environmental Protection Perspective

Mei at al. (2021) study an O2O freight platform in the joint presence of uncertain demand and a carbon emission cap. Under additive and multiplicative demand functions, they derive the optimal decisions on pricing and dispatching time. Using real data from such an O2O platform, they proposed an algorithm which can improve its revenue by 20%. Overall, their research provides insights on how to achieve the sustainable development of an O2O freight platform.

There has been a concern that food-delivery platforms have used too many single-use items such as plastic containers and utensils. To address this concern, Niu et al. (2021) focus on the interactions between a restaurant and an online food-delivery platform. The restaurant sells food in online and physical stores and cooperates with the online platform under a commission contract. For online orders, the restaurant also needs to choose between platform logistics and self-logistics. The authors find that the choice depends on the online market potential. However, the platform logistics strategy is better based on the sale quantity-based environmental index (EI) to measure sustainability.

Xu et at. (2021) argues that in business practice, when a manufacturer sells to customers via an online platform, it usually starts with one channel (marketplace or reselling) and adds the other later. Accordingly, they examine its sequential channel addition problem in the presence of a carbon cap. Their results show how equilibrium production outcomes (e.g., quantity and profit) are affected by the carbon cap and the channel addition sequence.

Xu et al. (2022) assume that a manufacturer sells to customers via an online platform using the marketplace mode. Meanwhile, the government imposes a region-cap on carbon emissions and implement either grandfather- or benchmark-based allocation rules for carbon emissions. The authors analyze the interactions between the manufacturer's production and delivery time decisions and the government's choice of allocation rule and setting of the region-cap. In particular, they focus on when either allocation rule results in higher carbon emission or social welfare.

Platform service supply chains have a dark side in terms of environmental sustainability. This is true in bicycle-sharing platforms where "cycling cemeteries" may occur. To address this challenge, Zhang et al. (2021a) propose a dynamic repositioning model with demand forecasted using a data-driven neural network. Employing techniques including Adaptive Genetic Algorithm and Granular

Tabu Search, they are able to simultaneously minimize the operator cost and penalty cost at each time interval.

Future Research Directions

The 26 papers included in this special issue have contributed to the progress and development of Platform Service Supply Chain Management. They have also suggested a few potential directions for future research from the perspectives of economic performance, social responsibility and environmental protection.

From the economic perspective, first, firm cooperation (Avinadav et al., 2022) and competition (Xie et al., 2021; Ye et al., 2021) in PSSC have considerable potential for future research. According to Xie et al. (2021), further research can consider the coexistence of platform competition and cooperation, or cooperative competition, and introduce vertical differentiation of service cost and quality among platforms. Second, exploring the selection and adoption of new platforms in different industries is very promising (Bai et al., 2021; Charpin et al., 2021; Shi et al., 2021; Zhou et al., 2021; Zhen et al., 2021). With the continuous development of the industries, the challenges faced by platforms will become more complex. Hong et al. (2021) argue that the selection and adoption of new platforms can be studied from more dynamic perspectives in the future. For instance, an in-depth empirical study can be conducted based on time series data. Third, much research in PSSC can be done on operational strategies (He et al., 2021; He et al., 2022; Zhang et al., 2021b), consumer reviews (Li et al., 2021b), consumer complaints (Yan et al., 2021), and customer repurchase intention (Yeo et al., 2021). Furthermore, as many authors in this special issue have noted, their research has certain geographical and industry limitations. Hence, it is worthwhile to extend their research to other countries/regions and industries in the future.

From the social responsibility perspective, there is great potential for future research. As shown in this special issue, many new social responsibility issues have arisen in the context of PSSC, such as cancellation of orders (Li et al., 2021a) and big data discriminatory pricing (Liu et al., 2021). In the future, scholars can continue to pay attention to the development and reform of the industry and explore these new problems. At the same time, as mentioned by Liu et al. (2021), the behavior characteristics of managers and consumers have a significant impact on the social responsibility of companies, such as the risk aversion behavior of the service platform and the fairness concern behavior of consumers. The consideration of these behaviors is also beneficial to future research.

From the environmental protection perspective, the current related research in the field of PSSC mainly focuses on the challenges faced by platforms under the context of carbon emission cap (Mei et al., 2021; Xu et al., 2021; Xu et al., 2022). It is foreseeable that carbon emission reduction will remain an active research issue in PSSC. As argued by Mei et al. (2021), the combination of carbon emission reduction and traditional classical problems such as the last mile problem is very interesting. Meanwhile, unique environmental problems associated with the emergence of platform supply chains have also been observed and analyzed by scholars (Niu et al., 2021; Zhang et al., 2021a). Since different types of platform supply chains have different characteristics, it is

necessary to devise environmental protection countermeasures accordingly. This is another promising research direction in the future.

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