



Actors' Behaviours in Responding to Green Incentives in the Food and Beverage Industry: A Scoping Review

Paulina Kus Ariningsih

Fakultas Teknologi Industri, Jurusan Teknik Industri, Universitas Katolik Parahyangan
Jl. Ciumbuleuit 94, Bandung 40141
Email: paulina.ariningsih@unpar.ac.id

Abstract

Understanding the actors' behavior is an essential step to recognizing the standpoint of each actor to generate a strategy that facilitates collaboration and healthy competition in creating a green and sustainable impact. By defining a suitable strategy, the optimization of collaboration and competition in a sustainable food and beverage supply chain can be performed through game theory optimization. Therefore, this study aims to understand the description of the actors' behaviors corresponding to sustainable incentives in the food and beverage industry in existing game-theory optimization literature. This study was carried out by conducting a literature scoping of two significant databases: Scopus and Web of Science. 1816 articles were identified in the initial selection, and 25 were deeply evaluated and mapped. The literature scoping review shows that the supply chain's performance and interaction are related to the actors' actions, which have an independent interest, though they share a common desire to maximize its benefits. The main financial incentives are found in the game theory literature. However, the other incentives are not yet explored thoroughly. In the near future, it is suggested to conduct research on formulation of ethical and social incentives in order to be utilized in game theory optimization.

Keywords: Scoping Review, Optimization, Game Theory, Green Incentives, Behaviours, Food and Beverage Industry

Abstrak

Mengetahui perilaku aktor adalah langkah penting dalam mengenali cara pandang aktor dalam membangun strategi yang memfasilitasi kolaborasi dan kompetisi yang sehat untuk menghasilkan dampak hijau dan berkelanjutan. Dengan strategi yang tepat, maka kolaborasi dan kompetisi yang optimal pada rantai pasok makanan dan minuman yang berkelanjutan akan dapat terbentuk lewat optimasi teori permainan. Maka, studi ini bertujuan untuk memahami disekripsi perilaku aktor dalam merespon insentif pada industri makanan dan minuman dalam literatur optimasi teori permainan. Studi ini dibangun dengan menerapkan metode *literature scoping* pada artikel dari dua basis data: *Scopus* dan *Web of Science*. 1816 artikel teridentifikasi pada seleksi awal dan 25 artikel dievaluasi dan dipetakan dengan seksama. Hasil review *literature scoping* menunjukkan bahwa performansi dan interaksi rantai pasok tergantung pada aksi dari aktor yang memiliki kepentingan mandiri, meskipun dengan kesamaan memaksimalkan keuntungan sendiri. Insentif finansial utama ditemukan dalam literatur teori permainan. Namun, insentif lainnya belum dijajaki secara menyeluruh. Dalam waktu dekat, disarankan untuk melakukan penelitian tentang formulasi insentif etis dan sosial untuk digunakan dalam optimalisasi teori permainan.

Kata kunci: Scoping Review, Optimalisasi, Teori Permainan, Insentif Hijau, Perilaku, Industri Makanan dan Minuman

Introduction

Showing the improved awareness of the importance of a sustainable environment, business organizations are now placing sustainability goals as an important strategic decision (Beamon, 1999). This phenomenon can be seen in the global sustainability reports of several large and well-known companies such as Nestle, Coca-Cola, and Starbucks. Applying the sustainable environment concept in business organizations has great importance in sustaining the environment without compromising the economic impact (Lugo et al., 2022). The sustainable supply chain concepts are elaborated in more detail in the next section as theoretical backgrounds.

However, most food and beverage businesses are still experiencing difficulties implementing sustainability strategies due to low purchasing power and compromising product transportability (Gedam et al., 2021). Producers may sideline the decision to use sustainable initiatives in their supply chains for fear of losing competition due to consumer shifts or high costs (Belavina, 2021). In addition, consumers try to get as much profit as possible by choosing the cheapest Stock Keeping Unit (T). That may result in consuming products with more packaging layers (non-sustainable). For example, Starbucks initially only gave a discount of IDR 2,000 per glass for using a tumbler compared to the plastic cups provided, but now it is improving its strategy, namely with a tumbler day discount, which has increased from 20% to 50%. Besides increasing the purchase of tumblers, it can also indicate that few people bring their tumblers on Tumbler Day. That phenomenon exemplifies that the incentives generated by producers in the green supply chain are hardly adopted by their corresponding consumers.

On the other hand, the food and beverage industries contribute to Indonesia's largest non-oil and gas economy. This industry has grown by more than 7% and is expected to continue to increase by around 9% until 2019, with an investment value of 8 million dollars. Therefore, developing an on-target incentive strategy is crucial to ensure sustainable practices occur consistently across the supply chain.

The supply chain is an aggregate system to reform cradle raw materials into consumers' usable products by managing proper resources,

information, and finances. This system involves many individual and corporate agents (or said actors) who are assumed to work in the baseline of the economic rationale principle. Therefore, each actor generates an action by finding the most beneficial economic strategy (Shubik, 2002). Game theory attempts to describe and optimize multi-actors' behavior in the supply chain corresponding to economic strategy (Shubik, 2002).

Game theory has been used to show the behavior between competition and cooperation in the sustainable supply chain, including competitive entrepreneurship (Pineiro-Chousa et al., 2016). Research has shown debate on the impact of competitiveness in sustainability incentives. Firms must be more aggressively driven by sustainable initiatives to win the market (Lozano, 2011). However, a game theory model shows that a firm does not need to be too ambitious in sustainability (Sheng, 2011). This debate shows that the impact of collaboration or competitiveness is still limited in practical application.

In a competitive market, a company must determine the optimal strategy to gain bargaining power, initiate negotiations, or influence collaboration to win the markets, especially through sustainability incentives (Manteghi et al., 2021). On the other hand, the theoretical literature reviews on sustainability initiatives are still limited. Therefore, it is necessary to investigate further the behavior of corporate actors towards sustainable incentives in the supply chain, especially in the scope of optimization. Zhong et al. (2017) performed an analysis of sustainable drivers in general and did not explicitly scope the optimization literature.

Previous paragraph has emphasized the importance of embracing game theory on testing and optimizing the incentive strategy to match with actors' behavior. However, the literature survey and review on the actors' behavior in game theory is not found. Based on the description above, the formulated problems of this research are: **How are the actors' behaviors responding to sustainable incentives in the food and beverage industry described in existing game-theory optimization literature?** The research question is investigated through a literature scoping review. To the best of our knowledge,

this article is the first attempt to investigate the actor's behavior from the perspective of game theory optimization method. The potential contributions of this article are following:

- Presenting the actors' behavior in responding green incentives that has been studied in the literature of game theory through systematic scoping review
- Developing the managerial implications on the findings of actors' behavior in responding the green incentives
- Proposing the future research gaps

The structure of this article is as follows. The theoretical background is described in section two. While section three details the Literature Scoping Review Methodology. Section Result and Discussion reflects the discussion of literature scoping review result and future potential research. The conclusion is summarized in the last section.

Methodology

This research builds on two main concepts of sustainable supply chain and game theory. The first subsection details concepts in sustainable supply chain theory, and the second section describes the main concept of game theory.

Sustainable Supply Chain

A sustainable supply chain integrates all parties involved in the supply chain to reduce negative environmental impacts due to production and consumption activities (Dubey et al., 2017; Gaur et al., 2017). The sustainable supply chain is a system with many activities that have developed from manufacturing initiatives to increase efficiency by reducing waste (Frosch & Gallopoulos, 1989), creating product designs that reduce negative impacts on the environment through design for the environment (Graedel & Allenby, 1996), to

developing towards a circular economy (Graedel & Allenby, 1996; Genovese et al., 2017). Because of its growing complexity, performance measures in a sustainable supply chain are evolving from reducing costs, waste, carbon emission, and energy consumption to other performance requirements such as social impact measurement (Genovese et al., 2017). The sustainable supply chain is also called the green supply chain for pointing out its impact on environmental sustainability. Therefore, the initiatives are often labeled green products, a green system, and a green supply chain.

In addition, the complexity of sustainable supply chain management can be seen from the framework and drivers that influence it (Dubey et al., 2017). The framework shows that pressure from within and outside the organization has the most influence in forming Sustainable Supply Chain Management (SSCM). These pressures appear in the various strategies to respond to competition. Moreover, the collaboration bridges the company to carry out more significant sustainable supply chain management initiatives.

Game Theory

Game theory has been a tool by economists to optimize decision-making. When it was developed by Von Neumann and Morgenstern in 1944, game theory attempted to build an optimum strategy for players in a competitive situation based on rational choice (Askari et al., 2019). This means that the strategy will be chosen if, and only if, the strategy is dominating and outperforming other alternative strategies to win the game. In game theory, the potential behaviors upon a particular strategy are mapped on the pay-off matrix (Pineiro-Chousa et al., 2016). The pay-off matrix shows the potential pay-off received by players for each possible strategy.

		Buyer	
		Green	Non-green
Supplier	Green	C,C	B,D
	Non-green	D,B	A,A

(a) Supplier-buyer

*Remarks : $A < B < C < D$; $a < b < c < d$

		Supplier-2	
		Green	Non-green
Supplier-1	Green	c,c	b,d
	Non-green	d,b	a,a

(b) Supplier-supplier competition

Figure 1. Prisoners Dilemma Pay-off Matrix for Buyer-Supplier Relationship in Responding to Green Initiatives (inspired by Pineiro-Chousa et al., 2016)

Classical game theory has been developed into different types to fit the variety of games in the real world. Standard classical game theory reviews the two-player pay-off matrix in which the players are making the decision at the same time. However, the Stackelberg model describes the sequential decision-making between players (Simaan & Cruz, 1973). The first player is named the leader, while the second player who responds to the leader's decision is the follower. Meanwhile, a cooperative game is a type of game theory where the players are not fully competitive (Carfí & Donato, 2022). On the other hand, the cooperative game theory allows cooperation and assumes that the transfer of coalitional profit can be performed through a characteristic function (Asian et al., 2019).

The evolutionary game theory is established to present the competitiveness of generations in the populations to shape the evolutions as interactions in the society. This type of game points out that players with bounded rationality could adjust their actions according to their previous and successful behavior (Yu et al., 2021). Evolutionary games allow more than one pair of players to play in a large number of rounds to resemble the society structures. Therefore, the evolutionary game is popular to study the relationship between the supply chain's actors (Zhang & Georgescu, 2022). Tripartite evolutionary game theory has three players (Peng et al., 2022; Wang, 2023).

Behavioral game theory is a type of game theory that is based on the assumption of hyper-rationalistic individuals (Askari et al., 2019). This assumption is based on the real behavior of humans, which are far from fully rational, as shown in the concept of behavioral economics. Interested readers in behavioral economics are suggested to read Ariely (2009) and Kahneman (2013). Behavioral game theory utilizes a psychological foundation in modeling principles (Camerer & Ho, 2015).

The simple forms of behavioral game theory are dictator games, ultimatum games, and prisoner's dilemma. In extreme conditions, the supplier-buyers' behaviors can be shown in a prisoner's dilemma problem. Figure 1 exemplifies the pay-off matrix of sustainable initiatives. When an actor has initiated a green initiative, the other player will obtain a certain number of pay-offs. The upper-left matrix with

pay-off (b,d) or (B, D) is obtained when a green incentive is initiated by the supplier, but consumers have not responded to the initiative as expected from the supplier. The prisoner's dilemma shows the need for collaboration between the players, which is shown in the equilibrium point of the matrix (c,c) or (C, C). In other words, each player must rationally maximize their results to ensure sustainability and the bonum of the commune. This reflects the hyper-rationality characteristics as the triggers of cooperation (Askari et al., 2019).

Literature Scoping Review

Scoping Review or Literature Scoping Review is one of the quantitative literature review processes primarily used in medical science (e.g., Bradley et al., 2017). A scoping review aims to provide charts or maps of the existing literature systematically (Munn et al., 2018). This method belongs to the quantitative review methodology with less extensive quantitative statistics than the systematic literature review (SLR) procedure. Therefore, this methodology deals with large data sets that are mapped without necessarily obtaining the significance of the review (Peters et al., 2021).

A scoping review addresses objectives and fills in information gaps about information concepts, theories, facts, and supporting evidence (Peters et al., 2021). This procedure may include an iterative process that begins with asking the research question. A registration and bias appraisal is non-mandatory in this procedure, but the standardized data shall be maintained (Munn et al., 2018).

Literature Scoping Review Process

A data search was carried out on two accessible databases, namely Web of Science and Scopus, on March 3, 2023, with the following search criteria:

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(TITLE-ABS-KEY ("supply chain" OR
"logistics") AND TITLE-ABS-KEY
("sustainability" OR "sustainable" OR "green"
OR "closed loop" OR "closed-loop") AND
TITLE-ABS-KEY ("optimization" OR "optimum"
OR "model") AND TITLE-ABS-KEY ("food" OR
"beverage")
AND LANGUAGE ( English ))
AND PUBYEAR > 2012
AND ( LIMIT-TO ( SUBJAREA , "ENGI" ) OR
LIMIT-TO ( SUBJAREA , "BUSI" ) OR LIMIT-TO
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(SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA , "ENER") OR LIMIT-TO (SUBJAREA , "DECI") OR LIMIT-TO (SUBJAREA , "MATH") OR LIMIT-TO (SUBJAREA , "ECON"))

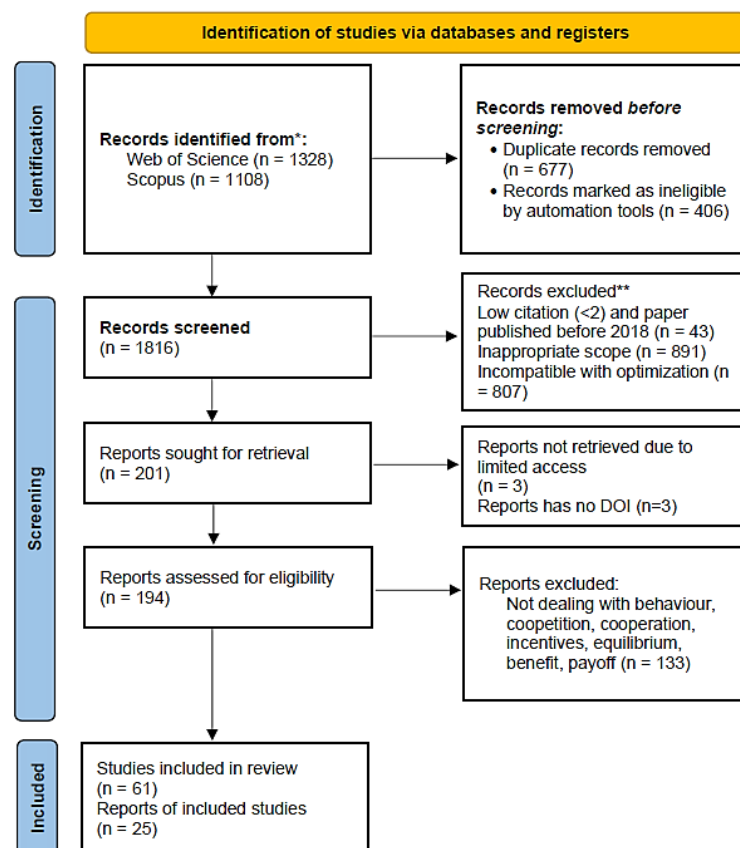
AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ch")).

The PRISM diagram from the literature review is shown in Figure 2. The search found 1328 articles from the Web of Science database and 1108 from the Scopus database. After removal or deletion and synchronization results from both databases, 1816 articles are processed. The process of screening eliminated 1755 articles. Sixty-one articles left for further checking.

An elimination based on citation is performed to ensure the credibility of the article. Here, we only included articles with citations >2 for any articles that have been published before 2018. We tried to filter as many high-quality articles as possible. Therefore, we chose to distinguish the high-quality article with as low level number of citation as possible. The number of citations has been utilized commonly

in the scoping review to distinguish between higher and lower-level articles (Munn et al., 2018, Peters et al., 2021). Meanwhile, for any articles published after 2018, the limitation of citation was not applied. Therefore, new relevant articles, which have limited time of exposure, still have a chance to be evaluated.

Finally, 25 articles are reviewed because of the appropriateness of the scope of the food and beverage supply chain, incentives, and behavioral optimization. Figure 3 visualizes the relationship between the keywords from the 61 articles included in the review. The figure shows that the main concepts of game theory, food, and food supply chain dominate the keywords of the articles. Some development concepts from game theory founds are included are evolutionary, Stackelberg. The extension topics in the food supply chain are agriculture, organic foods, food security, agri-food, and food safety. Meanwhile, the keywords extended from sustainability are sustainable development, greenhouse, and green supply chain.



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71. For more information, visit: <http://www.prisma-statement.org/>

Figure 2. PRISM 2020 diagram adapted on this study

Figure 4 depicts the overlay visualization through VOS Viewer from text analysis of 61 articles included in the review. The figure depicts the trend of topics in temporal dimensions. The COVID-19 disruptions and organic foods have been widely discussed lately, while in the earlier years, the research scopes were more focused on the agri-food supply chain and farmers.

The text analysis through VOS Viewers in Figure 5 shows that the concept of sustainability has become the central concept of the 61 articles. Sustainability has a closer relationship with food quality, cooperation, transportation, operation, farms, and retailers. The relationship is exemplified in the application of circular economy and reverse logistics (Gedam et al., 2021; Lugo et al., 2022). While technology is shown in a different cluster with blockchain.

Technology is more related to the competition, while blockchain is more related to the fairness concern. Blockchain has clear information and transaction transparency, therefore supporting the collaboration and enhancing fairness among collaborative partners (Liu, 2023).

The 25 articles that are included in this study were separated from 61 articles due to the method used in optimizing the behavior. Twenty-five articles apply game theory optimization, while the rest of the articles apply other optimization methods such as mixed integer linear programming, non-constrained optimization, multi-criteria decision-making, and DSS or simulation. In this article, we focused our detailed review analysis on the 25 game theory articles. However, the 36 articles are also observed to build supportive arguments and to find the literature gap.

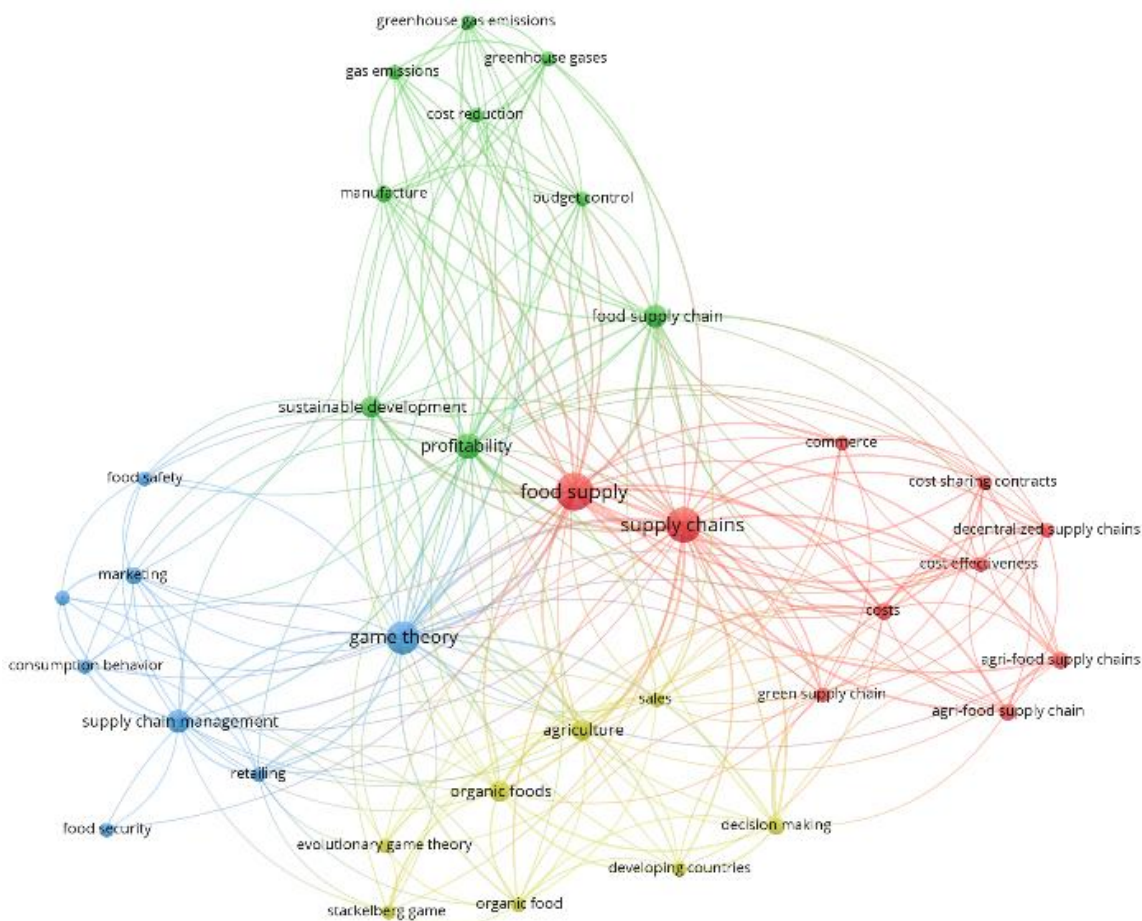


Figure 3. Cluster Visualization through VOS Viewer that Maps Keywords from 61 articles included in the review

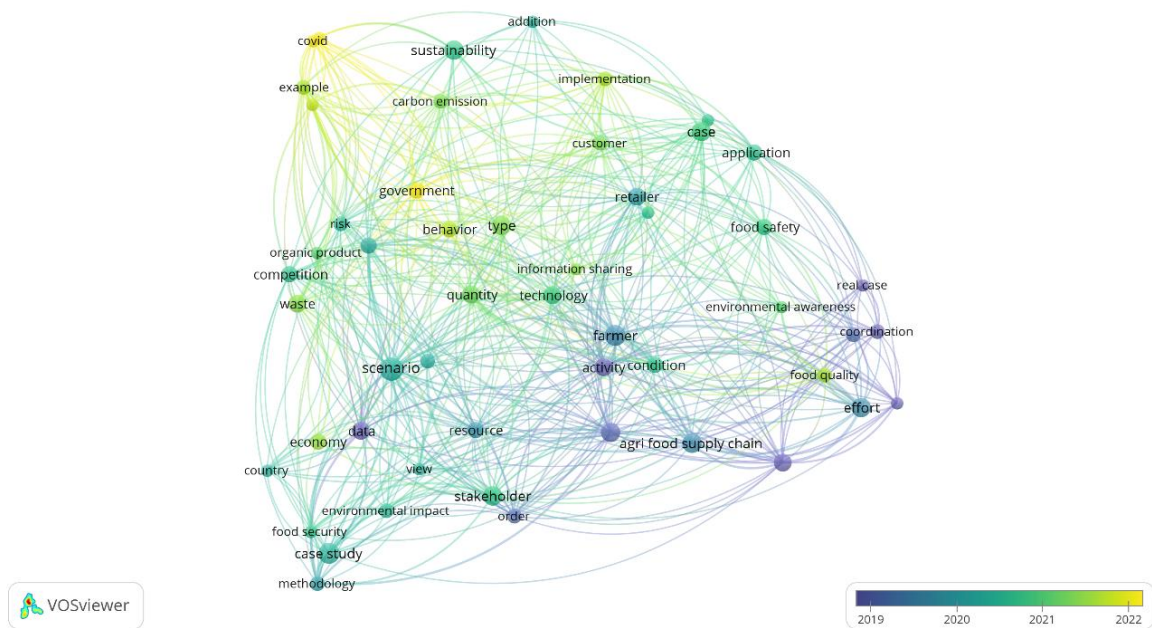


Figure 4. Overlay Visualization through VOS Viewer that Maps Keywords from 61 articles included in the review

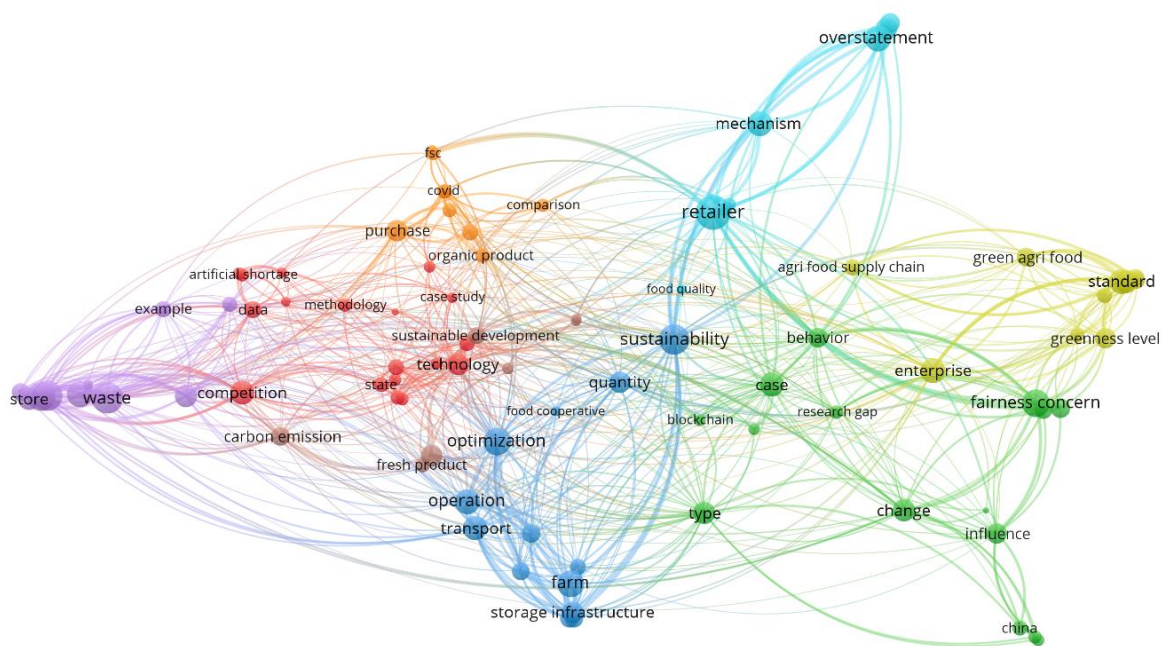


Figure 5. Cluster Visualization through VOS Viewer that Maps Text in Abstracts from 61 articles included in the review

Result and Discussion

This section describes the results of the literature scoping review. The first subsection details the actors involved in the food and beverage supply chain and also the structure of the food and beverage sustainable supply chain. The second subsection elaborates on the incentives, drivers, and drawbacks for each actor in responding to the green initiatives. While the last subsection details our proposal

on the practical implications toward food and beverage industries.

Food & Beverage Supply Chain

The food-and-beverage supply chain defines itself as a supply chain that manages the food and beverage products across the product's lifetime (Zhong et al., 2017). This supply chain operates in the food and beverage industries.

Naturally, the virgin material of food and beverages originated from nature, which is

manufactured or processed or directly sold to consumers. The virgin materials are normally cultivated in a proper cultivation process by the farmers. Here, we define farmers as the person or organization that cultivates or collects any kind of food material from nature. Farmers can work through planting (Philip & Marathe, 2022), raising livestock (Biase et al., 2022), fishing (Tabrizi et al., 2018; Wang, 2023), hunting, and farming (Mu et al., 2023).

Due to limited resources for farmers and the vast benefit of farming products to societies, the government's role is to regulate farming activities, including pricing (Xue & Xu, 2023). The government is also interested in ensuring food safety, surety, and security for its people (Levi et al., 2022). Therefore, the supply chain operation also becomes a concern of the government.

The end consumers are individuals or households (Belavina, 2021; Chan, 2023) that enjoy the benefits of food or processed food and beverages in the form of farmer's products, as ingredients of their diets, or manufacturers/producers' products, as pre-processed food or ready-to-consume products. Retailers would act as the intermediate between consumers and either manufacturers/producers or farmers (Zhong et al., 2017).

Manufacturers are defined as all organizations or individuals who give value added to the food (either pre-processed food or raw materials) prior to the selling. Here, it can take the form of restaurants (Read et al., 2020), catering (Jayalath et al., 2022), as well as gigantic food and beverage companies. In actual practice, it is clearly seen that manufacturers or producers may sell the products through retailers or directly to consumers.

The food and beverage industries involve supportive packaging and raw materials (Islam et al., 2021; Zhu et al., 2018) to ease the logistics process as well as to preserve the quality of the products (Manteghi et al., 2021). Moreover, the size of the organizations and businesses, especially manufacturers and farmers, would determine the complexity of the supply chain.

This study limits the term of actors as key stakeholders that handle a direct flow of main material/ingredients from the cradle to the grave (Zhong et al., 2017), such as farmers,

manufacturers, retailers, consumers, and governments.

Actors' Behavior in Food and Beverage Supply Chain in Selected Articles

Following the definition and structure of the food supply chain mentioned above and the literature scoping review process, the actor's behavior map based on each literature is presented in Table 1. Table 1 is obtained by evaluating the concept of each article. Here, we follow the claim given by the author in the initiatives and game theory methods used. We use the keyword phrase of the claim and crosscheck with existing terminology in the literature.

Table 1 shows that manufacturers are the vocal points of the discussions. On the other hand, although the consumer is also mentioned in the majority of the literature, the portion of discussions is very limited. Meanwhile, subsidies and cost-sharing are the most discussed initiatives as the drivers of the behaviors of actors, along with organic farming. Based on reviewing the articles in Table 1, the drivers and drawbacks of each actor can be obtained.

The main driver for farmers is sustainable farming practices (Peng et al., 2022; Zhang & Georgescu, 2022). The farmers are concerned with green food production (Zhu et al., 2022; Zhu et al., 2018), agricultural practices, efficiency in supply chains (Yu et al., 2021), investment decisions (Wang, 2023), and green innovation in agriculture (Cui et al., 2020). Farmers focus on optimizing the cost, enhancing the practice of sustainability of the food, and improving the profit (He et al., 2019; Mu et al., 2023; Philip & Marathe, 2022). Farmers have drawbacks on the high operational and logistics cost, low yield, high investment cost, and tight market requirement. Farmers' costs and yield are related to competitive advantage and profitability (Asian et al., 2019; Philip & Marathe, 2022).

The consumers are driven by health and environmental consciousness. Consumers have considered product quality (Peng et al., 2022; Zhang & Georgescu, 2022), food freshness and sustainability level (Xue & Xu, 2023), food safety (He et al., 2019), environmental impact, and personal preferences (Zhao et al., 2021b). Consumers possess drawbacks to the high price of

sustainable food, the variation of food quality and safety (Zhao et al., 2021b), and limited availability (Levi et al., 2022). The variation of quality and safety links with the trust and personal values toward the food available in the market. Product availability is related to the price as well as the preferences. The consumer might be interested in the sustainable product because of its positive impact on personal morals and values. However, the scarcity might generate higher prices. Consumers are also concerned with clear labels (Lau et al., 2020) to fit personal preference on the products' quality and safety.

The retailers are interested in enhancing profitability (Musavi et al., 2022); therefore, retailers are concerned with fair pricing, fairness

in profit distribution, coordination mechanisms, sales channels, distribution efficiencies, labeling accuracy, and innovation in distribution channels (Asian et al., 2019; Cao et al., 2020; Lau et al., 2020). Retailers demand to adopt strategies to optimize profits while meeting consumers' demands (Cao et al., 2020). Therefore, the struggle to ensure fair profit distribution has been a drawback for retailers. Other drawbacks for retailers are the efficient supply chain, which requires higher inventory (Asian et al., 2019; Levi et al., 2022), investment (Liu et al., 2020), and the consumers' low product knowledge. Retailers are required to give extra effort and resources to educate consumers, especially on the benefits and competitiveness of green products.

Table 1. Resume of Selected Articles in Game Theory that Focused on Food and Beverage Sustainable Supply Chain

Author (year)	F	M	R	C	G	Innovations / Initiatives	Methods
(Xue & Xu, 2023)		v		v	v	subsidy for food supply chain	Stackelberg
(Philip & Marathe, 2022)	v		v			organic farming	Classical
(Carfí & Donato, 2022)		v	v			plastic pollution	Coopetitive Game
(Peng et al., 2022)	v	v		v		food safety	Tripartite Evolutionary Game
(Zhang & Georgescu, 2022)	v			v	v	large scale agriculture	Evolutionary Game
(Levi et al., 2022)			v	v	v	subsidy for food supply chain	Behavioral Game-Theoretic
(Lugo et al., 2022)		v		v		circular economy for food lost and waste	Classical
(Yu et al., 2021)	v		v			information sharing	Stackelberg
(Manteghi et al., 2021)		v		v		food additives	Evolutionary Game
(Zhao et al., 2021a)		v	v	v		dual channel fairness model	Stackelberg
(Cao et al., 2020)		v	v			novel contract based	Evolutionary Game
(Shen et al., 2020)		v	v			dishonest report on sustainability	Stackelberg
(Cui et al., 2020)	v		v			green farming and marketing	Stackelberg
(Lau et al., 2020)			v	v		product labeling organic food	Classical
(Asian et al., 2019)	v		v			sharing economy in organic food	Cooperative Game
(Wang, 2023)	v	v				labeling in packaging	Tripartite Evolutionary Game
(Tabrizi et al., 2018)	v		v			fishery collaboration	Nash-Cournot And Nash-Stackelberg
(Zhu et al., 2018)	v		v	v		cost sharing	Stackelberg
(He et al., 2019)		v		v		green innovation efforts	Stackelberg
(He et al., 2020)	v	v				green innovation	Stackelberg
(Mu et al., 2023)	v	v	v	v	v	social co-governance	Evolutionary Game
(Liu et al., 2020)		v	v			big data and blockchain	Stackelberg
(Musavi et al., 2022)		v	v	v		novel pricing decision	Stackelberg
(Zhu et al., 2022)	v	v				cost-sharing	Cost-Sharing Contracts-Based Stackelberg

F = farmers; M = manufacturers/producers; R = retailers; C = consumers; G = government

Manufacturers are concerned with the development of green products that meet consumers' preferences through innovation and investment in sustainability production (He et al., 2019, 2020). Manufacturers also consider profit optimizations through cost-sharing mechanisms (Zhu et al., 2022; Zhu et al., 2018), supplier-buyer coordination and brand development (green marketing (Zhu et al., 2022) and labeling (Wang, 2023)). In terms of green marketing, manufacturers must avoid overstatement of the sustainable claim to improve the brand credibility and to gain the trust of its consumers (Shen et al., 2020). The strategy of manufacturers to improve profits includes simplifying the coordination and proper assessment of the investment of sustainable projects (Liu et al., 2020).

The government puts a higher priority on regulatory compliance and oversight. The government regulates the standards, policies, and fairness in the industry to meet sustainability levels (Levi et al., 2022; Xue & Xu, 2023). The government establishes governance frameworks and social co-governance (Mu et al., 2023) and practices enforcement approaches and penalty mechanisms, as well as promotes sustainable and responsible behavior across the supply chain (Xue & Xu, 2023). The government seeks practices that contribute to a healthier environment, ensure the safety and health of consumers, economic growth (Carfi & Donato, 2022), and job creation.

The description of drivers and drawbacks found in this research has been an extension of the analysis performed by Zhong et al. (2017), which validates the importance of cost, ethical motivations, consumer preference, government regulation, and commitments. This research points out the drivers and drawbacks of each key stakeholder.

Managerial Implications

Managerial implications are derived from the result of scoping review regarding the drivers and drawbacks of each actor. The managerial implications are developed with the main goal of proposing the key consideration points on building green incentives strategy for each actor in the food and beverage industry following the key drivers and drawbacks of each actors.

The discussion on actors' behaviors might imply that food safety and security are the main drivers for two key stakeholders of government

and consumers as an embodiment of trust and personal values toward foods. Therefore, it is important to ensure the design of future green incentives to emphasize the practice of food safety and security across the circular chain. A success stories of synergizing the practice of food safety with green incentives had been noted by Xian et al. (2017). Archese et al. (2016) shows that promotion of green practices which contribute toward food safety requires open innovation and cost sharing strategy.

Meanwhile, the stream of products' agents, such as farmers, manufacturers, and retailers, are more interesting on the side of profitability and productivity. An agreement for sharing risks and responsibilities on generating a green yet productive environment or business ecosystem can be an initial principle for developing the green incentives. Sharing risk can be managed in the (Business-to-business) B2B replenishment contracts.

On the other hand, the concept of sharing economy might be an alternative option to complement the circular economy practices. The activity of sharing economy is focused on the shared used of goods and services with access over ownership (Puschmann and Alt, 2016). Curtis and Mont (2020) note positive impacts of sharing economy toward sustainability in food beverage industry.

Conclusions

The literature has shown that optimization research using game theory in the food and beverage supply chain is still rarely carried out. The literature scoping review identified the behavior of the actors in the game-theory optimization literature. The behaviors of actors in the food industry's supply chain, including the government, customers, farmers, manufacturers or producers, and retailers, crucially shape the outcomes and performance of the supply chain. Therefore, understanding the behavior is crucial to fostering sustainability, collaboration, and competition in the food and beverage industry. This utilization of citation count > 2 for articles before 2018 had set a limited generalization of this research for other topic for scoping review aside from the limitation embedded.

Future Research Opportunities

In this subsection, we present future research opportunities as our theoretical

contributions, as a bridge the result of our research and current research practices. Future research opportunities are developed based on two points of views: the extensions of actors' behavior and the necessity of improving the methodological rigor. The extensions of actors' behavior are obtained from insights derived by comparing the articles in Table 1 with the supporting articles. While improvement of methodological rigor is suggested based on the growth of game theory methods.

The personal motivation and morals affecting consumers' choices of sustainable food products can be affected by the desire for healthier and mindfulness on the ethical side and environmental concerns (Timpanaro & Cascone, 2022). The consumer's preference is also influenced by the convenience and accessibility of sustainable products (Belavina, 2021; Chan, 2023; Wahyudin et al., 2015).

The behaviors of farmers, retailers, and manufacturers are extended to the practical actions of sustainability. Supporting articles have shown more adaptations of sustainability initiatives, including waste reduction (Dellino et al., 2017; Li et al., 2022; Putra, 2019), balancing the thread-off between sustainable cost and profit (Belamkar et al., 2023), efficiency in energy (Read et al., 2020; Shen et al., 2020), eco-friendly packaging materials (Chan, 2023), ethically and locally sourced of raw materials (Hajimirzajan et al., 2021; Saetta et al., 2015). Therefore, it is suggested to further investigate the optimization of the initiatives through game theory.

From the evaluation of incentives, we may find that some incentives do not fit with financial measurement, such as ethical considerations and environmental concerns (Lovegrove et al., 2023; Timpanaro & Cascone, 2022). Meanwhile, the main points of the game theory models focus on the financial measurement that is reflected in the pay-off matrix. Therefore, it is important to find the current measurement of the incentives before modeling and optimizing the behavior through game theory.

In Table 1, it is seen that the concept of Stackelberg is heavily adopted in the literature, followed by the evolutionary game theory. The nature of sequential decision-making in the supply chain is reflected well in the Stackelberg theory. Sequential decision-making happens due to the need to respond to the consumer's demand and the farmer's yield. However, the behavioral game theory concept is rarely

applied in the existing literature. Meanwhile, it is important to understand that cooperation can be the best option in sustainability initiatives, especially when dealing with consumers. The hybridization of behavioral economics to predict the pay-off function in game theory is worth considering.

Moreover, the current research in game theory has focused on the response of each actor to financial incentives through green initiatives. The research gap found in the other incentives does not fit with financial measurement. Therefore, it is important to find the current measurement and reasoning of the incentives before modeling and optimizing the behavior through behavioral game theory.

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