

The effects of the consumers' environmental awareness on the manufacturer's encouragement

Olha Ilyash

Doctor of Sciences (Economics), Professor, Professor of the Economic Cybernetics Department,
National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute»
ORCID 0000-0002-7882-3942
e-mail: oliai@meta.ua

Liubov Smoliar

Candidate of Sciences (Economics), Professor, Professor of the Enterprise Management
Department,
National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute»
ORCID 0000-0002-5626-4043
e-mail: lgsmoliar@gmail.com

Anil Akat

Postgraduate Student, University of Economy in Bydgoszcz
ORCID 0009-0007-1689-6312
e-mail: anillkat@hotmail.com

When it comes to manufacturing, a by-product refers to the outcome of a typical manufacturing process that has a lower net realizable value (NRV) and/or a smaller volume than the primary product. As these by-products are not expected to have any effect on financial reports, they are not allocated common costs. Conventionally, they are not listed, but their NRV is typically recorded as either “other revenue” or a reduction in processing costs that are co-produced during their production. By-products are essentially secondary to the primary product or service that is being produced, resulting from chemical reactions, production processes, or manufacturing processes.

By-products are a variable commodity that can serve a functional purpose or be considered refuse. For instance, bran, a by-product of wheat that results from the milling of refined flour, may either be incinerated or composted as waste, or it could be put to use. Nutrients that are present in food intended for human or animal consumption could also be considered by-products. Gasoline, originally a by-product of oil refining, has now become the quintessential fuel for automobiles. The plastic used to create plastic bags also originates from oil refining by-products. The International Energy Agency (IEA) distinguishes four types of by-products in the context of life cycle assessment: «Main product,» «by-product» (which yields similar revenue to the main product), «by-product» (which arises from a reduction in the main product), and «waste» (generating little or no revenue).

The author's research delves into the decision-making process of members regarding four game-theoretic contract models, including the factors of complementary product supply chains, environmental consciousness among consumers, and government-provided green subsidies. As consumption and production continue to evolve and become more globalized, complementary product strategy is increasingly vital, with complementary supply chain management being a crucial aspect for businesses. In 2001, Apple's iPod was released and accompanied by the world's largest music store, iTunes, which allowed the company to ultimately dominate 70 % of the MP3 market in the United States. Meanwhile, in response to the general decline in the camera industry, Leica, a well-known German camera brand, altered its prior product strategy and formed a partnership with Huawei to take advantage of their complementary strengths [1]

Through astute recognition of their customers' needs and wants, IKEA has successfully bridged the gap between two seemingly disparate fields: furniture and food service. Their extensive research delves into the intricacies of decision-making processes surrounding price and sustainable innovation in the supply chain of complementary products, particularly in cases where government incentives for green practices are provided to retailers. Consequently, it can be inferred that more and more companies are being encouraged to incorporate environmentally

friendly innovations and prioritize green supply chain management in the context of advancing the green economy. Notable examples of such companies include Huawei, HP, Apple Inc, and Procter & Gamble. Conversely, the increasing competition within the market has also led to a heightened focus on the strategies surrounding complementary products and their supply chain management.

While there is some theoretical discussion on the matter, there are few empirical studies that have explored decisions regarding green complementary supply chains and contracts [2,3,4]. The results of these studies reveal several key findings. Firstly, the influence of government green subsidies and environmentally conscious consumers is clearly seen in both centralized and decentralized supply chains of complementary products, regardless of the contract type. This increased awareness and demand for ecological products has a positive impact on environmental preservation. Additionally, when it comes to the market, heightened consumer awareness of environmental protection can encourage manufacturers to improve the environmental impact of complementary products, as illustrated in Figure 1.

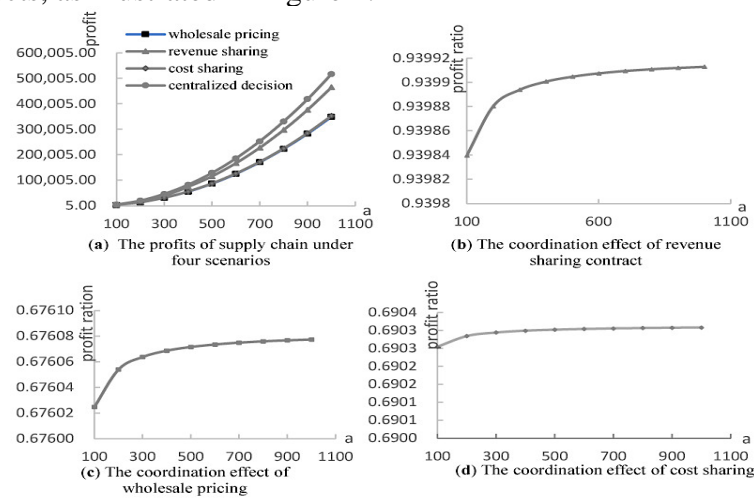


Figure 1 (a, b, c, d) – The effects of the consumers’ environmental awareness on the encouragement of manufacturers to improve the green degree of the complementary products
Source: developed by the authors

Thus, the degree of incentives for both consumers and the government is elevated when there are utility spillovers present between complementary products. As a result, during the process of achieving carbon peaking and carbon neutrality, leaders of supply chains and governments can utilize strategies that involve complementary products to enhance the efficiency of green innovation. A good example of such a strategy would be the active management of consumer green consumption, which can generate spillover effects that are beneficial for complementary green products. Additionally, compared to wholesale price contracts, contracts that involve revenue and cost sharing can not only encourage manufacturers to boost the ecological sustainability of their supply chains and subsidize ecologically sustainable products, but can also lead to a Pareto improvement of the supply chains. This is provided that the performance parameters of the contracts are reasonable and helpful for supply chain optimization. Furthermore, revenue sharing agreements tend to be more effective than other types of contracts.

References:

1. Smoliar L., Ilyash O., & Акат, А. The impact of the e-commerce by-products sales on the companies’ development. Підприємництво та інновації, 2023. (28), 64-69. <https://doi.org/10.32782/2415-3583/28.10>
2. Sammut-Bonnici T., McGee J. and Avgeropoulos S. (2015) Complementary Products. Wiley Encyclopedia of Management, https://www.researchgate.net/publication/313924766_Complementary_Products
3. Brandenburger, A. and Nalebuff, B. (1995) The right game: use game theory to shape strategy. Harvard Business Review, 73 (4), 63– 64.

4. Venkatesh R., Kamakura W. (2003) Optimal bundling and pricing under monopoly: Contrasting complements and substitutes from independently valued products. *J. Bus.* 76: 211–231. DOI: 10.1086/367748.
5. Chris M., Yan R., Wang J., Ghose S. (2013). Bundling products to success: The influence of complementarity and advertising. *J. Retail. Consum. Serv.* 21: 48–53.