МЕНЕДЖМЕНТ

Shmygol Nadiia
Zaporizhzhia Polytechnic National University, Ukraine
Warsaw University of Technology, Poland
ORCID: https://orcid.org/0000-0001-5932-6580

Polcyn Jan
Sumy State University, Ukraine
ORCID: https://orcid.org/0000-0001-7847-2743

Antoniuk Andrii
Classic Private University, Ukraine
ORCID: https://orcid.org/0000-0002-9591-394X

SUPPLY CHAIN MARKETING MANAGEMENT

The article explores the work of scientists in organizing marketing activities in a company, specifically in managing the distribution policy that involves organizing distribution channels, forming a portfolio of contractual obligations within the product portfolio, and developing a supply plan for each contractor. It is noted that the organization of distribution channels in a company must ensure: the creation of a system for delivering products to the point of sale or operation at an exactly specified time and with the highest level of service; minimizing costs for organizing the movement of goods, which should in no case affect the level of service. It has been proven that the advantages of including a wholesale intermediary in the distribution system are: ensuring product distribution in the absence of contact with the consumer; bulk purchasing reduces supply costs; reducing the risk of unsold products; favorable pre-payment conditions, etc. However, the negative factors that arise as a result of the inclusion of intermediaries in the product distribution channels are: a large number of intermediaries significantly reduces market control and complicates the interaction process with the consumer; dependence on a small number of intermediaries in the future can cause serious commercial losses. Therefore, in practice, in order to reduce risk, mixed forms of product movement organization should be used, which in turn requires the development of new methods and approaches to this process. As a result of the analysis, it was determined that the need for re-organization of the existing distribution channel system arises when the company's production capacities are not fully supported by the capacity of the trade network. To diagnose such a situation, graph theory, in particular the adapted maximum flow problem, is used within the framework of this research. The authors stated that the result of applying the proposed models and methods is optimization of the existing distribution channel structure and development of further management methods for the company's distribution policy, including formation of its portfolio of contractual obligations and construction of a map of competitive advantages.

Key words: *marketing activity, supply chain management, distribution channel organization, contract portfolio formation.*

Шмиголь Н.М.
Національний університет «Запорізька політехніка», Україна
Warsaw University of Technology, Poland

Jan Polcyn
Сумський державний університет, Україна

Антонюк А.А.
Класичний приватний університет, Україна

МАРКЕТИНГОВЕ УПРАВЛІННЯ КАНАЛАМИ ПОСТАЧАННЯ ПРОДУКЦІЇ

У статті розглядаються дослідження науковців з організації маркетингової діяльності на підприємстві. Конкретно, вони застосовуються до управління збутовою політикою, яка включає в себе створення розподільних каналів, формування портфеля договорів в межах товарного портфеля та розроблення плану поставок для кожного контрагента. Організація розподільних каналів на підприємстві повинна забезпечувати: створення системи доставки продукції до місця продажу або експлуатації у відомий час та з максимально високим рівнем обслуговування; мінімізація витрат на переміщення товарів, при цьому не впливаючи на рівень обслуговування. Доведено, що включення оптового посередника в систему каналів розподілу може мати деякі переваги, такі як забезпечення збуту продукції, закупівля продукції оптовими партіями, зменшення ризику незатребуваної продукції та вигідні умови передоплати. Однак, також можуть виникнути негативні фактори, такі як суттєве зменшення контролю за ринковою ситуацією та ускладнення взаємодії зі споживачем, а також залежність від невеликої кількості посередників, що може призвести до серйозного комерційного збитку. Тому рекомендується використовувати змішані форми організації руху товарів, що вимагає розробки нових методів та підходів для зменшення ризику. Результат аналізу показав, що необхідність реорганізації системи каналів розподілу в підприємстві виникає в тому випадку, коли його

виробничі можливості не забезпечені відповідною пропускною здатністю торговельної мережі. Для діагностики такої ситуації, в рамках даного дослідження використовується теорія графів, зокрема, задача про максимальний потік, яка була адаптована аід поставлені задачі. Авторами зазначено, що результатом застосування запропонованих моделей і методів є оптимізація існуючої структури каналів розподілу продукції та розробка подальших методів управління збутовою політикою підприємства з формуванням портфеля договірних зобов'язань у межах його товарного портфеля, побудови карти конкурентних переваг.

Ключові слова: маркетингова діяльність, управління збутовою політикою, організація каналів розподілу, формування портфеля договірних зобов'язань.

Problem statement. One of the main elements of marketing activity at a company is supply chain management, which involves the organization of distribution channels, the formation of a contract portfolio within the product portfolio, and the creation of a delivery plan for each contractor. The organization of distribution channels at the company must ensure:

– the creation of a delivery system for products to the place of sale or operation at a precisely specified time and with a high level of service;

– the minimization of costs for organizing the movement of goods, which in no way can be reflected in the level of service.

Analysis of recent research and publications. Marketing management of product supply channels is an important scientific field that plays a vital role in successful product sales. Some well-known researchers who study this aspect include following.

Nada R. Sanders in the research [1] examine the impact of supply chain management practices on a firm's competitive advantage and overall performance. The authors used a survey method to gather data from various manufacturing firms in Turkey. They found that effective supply chain management practices can lead to significant improvements in a firm's competitive advantage and overall performance, including increased efficiency, reduced costs, and improved customer satisfaction. The authors concluded that firms that adopt and implement effective supply chain management practices will be better positioned to compete in the marketplace.

In the article "The impact of supply chain management practices on firm performance: evidence from the Chinese automotive industry" by Wei Jiang, Qing Liu, and Shuai Liu authors studied the relationship between supply chain management practices and firm performance in the Chinese automotive industry and found that effective supply chain management can lead to improvements in a firm's financial performance, including increased profitability and reduced costs [2].

The study "Supply Chain Management and its Impact on Business Performance" by Ping Xia, Wei Song, and Jian Liu [3] explores the relationship between supply chain management and business performance. The authors conducted a survey of firms in China and found that effective supply chain management practices can lead to improvements in a firm's financial performance, including increased profitability, reduced costs, and improved market share. The study also found that firms that have a strategic focus on supply chain management tend to have better business performance compared to firms that do not have such a focus.

Wei Li, John F. McLaughlin, and Bob R. Stone in their work "Supply Chain Management and Firm Performance: Evidence from Small and Medium-Sized Enterprises" [4] examine the relationship between supply chain management practices and firm performance, specifically focusing on small and medium-sized enterprises (SMEs). The study found that SMEs that adopt effective supply chain management practices tend to have better financial performance compared to firms that do not adopt such practices. The study also found that SMEs that have a strong focus on supply chain management are better positioned to compete in the marketplace and improve their overall performance.

In the study "Supply Chain Management in Polish Firms: An Empirical Study" by Agnieszka Łoboda, Małgorzata Kicińska, and Mariusz Łoboda [4], the authors aimed to explore the level of adoption and implementation of Supply Chain Management (SCM) practices in Polish firms. They conducted a survey of managers from various industries in Poland and analyzed the data using descriptive statistics and regression analysis. The results showed that Polish firms have a high level of awareness of SCM, but the implementation of SCM practices is still limited. The authors found that factors such as company size, level of internationalization, and sector of operation influence the level of SCM adoption. They also found that the implementation of SCM practices has a positive impact on the overall performance of the firm. The authors concluded that there is a need for further research to identify the specific SCM practices that are most effective in Polish firms and to explore the barriers to the adoption and implementation of SCM in these firms. They also suggested that Polish firms should focus on the development of their SCM practices to improve their competitiveness and achieve better performance.

According to Ukrainian scholars [6–12], specific market conditions of a business entity, such as the pricing policy of the producer, the product's specificity, the location of the consumers, the presence of its own retail network, determine the optimal distribution channel structure that minimizes related expenses and ensures the highest level of service.

The zero-level channel (direct marketing), when the manufacturer directly interacts with the consumer, is most effective under the following conditions:

– the product is specialized (of industrial-technical nature) and requires direct contact between the manufacturer and the consumer;

– the price of the product often changes;

– all consumers are located in a small area, in close proximity to the manufacturer's retail network;

– the manufacturer's retail network has a developed storage network;

– the market capacity is insignificant.

A one-level channel, when the manufacturer interacts with the consumer through the retail system, is effective if:

– the market is poorly understood, and the manufacturer's business lacks the financial resources to study it further;

– the volume of pre- and post-sales services is minimal due to the product's specificity;

– the number of market segments is minimal;

– the product is represented by a wide range of products on each market segment.

Inclusion in the retail intermediaries distribution system provides the manufacturer with several advantages: the retail intermediary has the opportunity to perform storage and sales operations through its trade network; provide advertising information to consumers and marketing information to the manufacturer of the product. Finally, the two-tier interaction channel between the manufacturer and the consumer, first through the wholesale system and then through retail trade, is the most effective if:

– consumers are located in a large territory;

– delivery of goods due to their specificity must be made in small but timely batches;

– the difference between the sales price and the cost of the product is sufficient to organize a widespread retail network.

In summary, the advantages of incorporating wholesalers into the distribution channel include ensuring product distribution in the absence of direct contact with consumers, reducing the cost of supplying products, reducing the risk of unsold products, and favorable pre-payment conditions. However, the disadvantages of having intermediaries in the distribution chain include a large number of intermediaries that significantly reduces market control and complicates the interaction with consumers, and dependence on a small number of intermediaries which may result in serious commercial losses. Therefore, in practice, a combination of methods should be used to reduce the risk, which in turn requires the development of new methods and approaches to the distribution process.

The aim of the article is to improve the methods of managing the distribution policy by optimizing the existing structure of product distribution channels and forming a portfolio of contractual obligations.

Explanation of the main research material. The need to reorganize the existing distribution channel system at the enterprise arises in cases when its production capacities are not fully supported by the throughput capacity of the trade network. To diagnose such a situation, this study proposes using graph theory, in particular, the adapted task of finding the maximum flow. In terms of graph theory, we will have an oriented weighted graph (Figure 1).

In terms of graph theory, the vertices of such an oriented graph represent a set of wholesale and retail intermediaries, the manufacturer, and the target consumer segments. Accordingly, the oriented edges connecting the vertices represent the directions of goods flows, and their weights are the capacity of the goods flow, which is limited by available resources (warehouse capacity, transportation capabilities, trading area) and contracts. The capacity of such a distribution channel system can be calculated using the Ford-Fulkerson algorithm. In summary, if a company's production capacity exceeds the capacity of the distribution channel system, ways to increase it can include identifying excess capacity at specific stages of product circulation and increasing it between the tops of graphs where it is a "bottleneck", creating new product flows between existing wholesale and retail intermediaries, and including a new intermediary in the existing wholesale and retail intermediary system.

The result is the optimization of the existing structure of product distribution channels and the development of further methods of managing the company's marketing policy, with the formation of a portfolio of contractual obligations within its product portfolio, and the construction of a map of competitive advantages.

In simpler terms, a large business produces products under agreements with its customers. The aim of this stage of marketing analysis is to balance the portfolio of contractual obligations according to the existing orders for product delivery and production capacities. During a certain period of time, the company receives orders for product delivery through distribution channels from consumers or wholesale or retail intermediaries, specifying the delivery dates and volumes. However, sometimes, considering the production capacities, the company may not be able to fully meet these orders. That is why the stage of forming a portfolio of contractual obligations for product deliveries involves choosing a subset of all existing orders that will ensure the highest profit while ensuring a sufficiently even load on the main production facilities.

Let the set of orders for the supply of a certain type of product be represented in the form of a matrix:
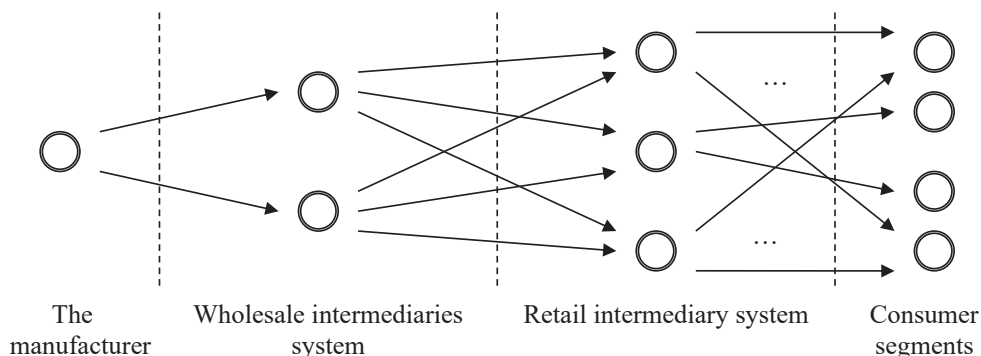

The manufacturer · Wholesale intermediaries system · Retail intermediary system · Consumer segments

Figure 1. Distribution channel diagram from the graph theory point of view

$$U = \begin{pmatrix} u_{11} & u_{12} & .... & u_{1n} \\ u_{21} & u_{22} & .... & u_{2n} \\ .... & .... & .... & .... \\ u_{m1} & u_{m2} & .... & u_{mn} \end{pmatrix}, \qquad (1)$$

where u_{ij} – the volume of product delivery in natural or nominal natural units in the i-th period for the j-th order;

m – duration of the planning period, in days;

n – quantity of orders for product delivery.

The process of forming a portfolio of contractual obligations will be determined by a vector α:

$$\alpha = \begin{pmatrix} \alpha_1 & \alpha_2 & .... & \alpha_n \end{pmatrix}, \qquad (2)$$

where α_j – logical variable that reflects the fact of concluding a contract for the j-th order.

Forming a portfolio of contractual obligations, it is necessary to take into account the production capabilities of producing a certain product. Let's:

$\overline{N}$ – average daily production capacity;

$$U' = \begin{pmatrix} u'_1 \\ u'_2 \\ ... \\ u'_m \end{pmatrix}$$ – total supply for each day of the planning

period, according to the contractual obligations, where

$$u'_i = \sum_{j=1}^{n} u_{ij}, \ i = \overline{1,m}.$$

Then the average daily supply according to contracts $\overline{u'}$ will be equal:

$$\overline{u'} = \frac{\sum_{i=1}^{m} u'_i}{m}. \qquad (3)$$

The constraint on production capacity takes the form of: $\overline{u'} \le \overline{N}$.

In order to ensure the even loading of the main production facilities, a restriction on the permissible deviation of total daily deliveries is also introduced (V_{max}), using the coefficient of variation (V):

$$V = \frac{\sqrt{\dfrac{\sum_{i=1}^{m}(u'_i - \overline{u'})^2}{m}}}{\overline{u'}}. \qquad (4)$$

The acceptable deviation of the total daily deliveries depends on the capacity of the storage facilities where the finished product is stored. Thus, the limit on the deviation of the total daily deliveries represents an inequality: $V \le V_{max}$.

Then the solution to the task of forming a portfolio of contractual obligations for product deliveries based on the order portfolio takes the form:

$$F = \sum_{i=1}^{m} \sum_{j=1}^{n} \left(u_{ij} \times u_j \times \alpha_j \right) \to \max$$

$$\begin{cases} \overline{u'} \le \overline{N} \\ V \le V_{max} \\ \alpha_j \in \{0;1\} \\ i = \overline{1,m}, j = \overline{1,n} \end{cases} \qquad (5)$$

The formed portfolio of contractual obligations is defined by a vector $\alpha = \begin{pmatrix} \alpha_1 & \alpha_2 & .... & \alpha_n \end{pmatrix}$, it is used in compiling a delivery plan for each contractor.

The obtained values of supply sizes for each time period, determined by production and storage capabilities, need to be distributed among customers in order to achieve the maximum profit from operational activity. Profit is the difference between income and expenses. In turn, income from product realization is determined as the product of the volume of product sold to a certain customer and the price of the product unit. Expenses from product realization include:

– fines for non-delivery of products, in accordance with the delivery agreement;

– fixed expenses (payment of wages to the sales department, cost of telephone communication, periodic publications, etc.);

– variable expenses (expenses for product storage, transportation expenses, etc.). When assessing the amount of total expenses, it is also necessary to take into account the amount of expenses for product production. To calculate the profit, according to the above-mentioned classification of expenses, it is also necessary to determine the amount of variable and fixed expenses.

Conclusion. Thus, the management of the company's distribution policy, which provided for the organization of distribution channels, the formation of a portfolio of contractual obligations within the commodity portfolio and the development of a plan for deliveries to each contractor, was decided within the framework of the approaches and tasks considered in a sequential manner. In the end, when applying the methods indicated, there is the possibility of obtaining such a product realization plan for contractors, which provides the company with the maximum profit, taking into account the commodity portfolio.

REFERENCES

1. Sanders, N. R. (2020). *Supply chain management: A global perspective*. John Wiley & Sons.

2. Jiang, W., Liu, Q., & Liu, S. (2014). *The impact of supply chain management practices on firm performance: Evidence from the Chinese automotive industry*. International Journal of Production Economics, 151, 166–177.

3. Xia, P., Song, W., & Liu, J. (2010). *Supply Chain Management and its Impact on Business Performance.*. International Journal of Production Economics, 132(2), 586–599. doi: 10.1016/j.ijpe.2010.06.006.

4. Wei Li, John F. McLaughlin, and Bob R. Stone (2011) *Supply Chain Management and Firm Performance: Evidence from Small and Medium-Sized Enterprises* International Journal of Physical Distribution & Logistics Management.

5. Łoboda, A., Kicińska, M., & Łoboda, M. (2018). Supply Chain Management in Polish Firms: An Empirical Study. International Journal of Management and Economics, 48(1), 31–41.

6. Корман, І, Семенда, О., & Осадчук, Н. (2021). Маркетингове дослідження каналів розподілу. *Економіка та суспільство*, (29).

7. Багорка, М. О., & Кадирус, І. Г. (2021). Маркетингове управління бізнес-процесами оптових торговельних підприємств. *Publishing House "Baltija Publishing"*.

8. Шмиголь, Н. М., Бірюков, Т. Р., Коломоєць, І. Л., & Антонюк, А. А. (2018). Закордонний досвід використання логістики внутрішніх водних шляхів для розвитку агробізнесу України. *Вісник Запорізького національного університету. Економічні науки*, (2), 112-121.

9. Гуменюк, А. В., & Школенко, О. Б. (2017). Маркетингове забезпечення процесу створення конкурентоспроможної овочевої продукції. *Економіка та суспільство*, (12).

10. Шмиголь, Н., Риженко, О., & Касянок, М. (2021). Управління фінансово-економічною стійкістю підприємства в контексті застосування інструментів фінансового менеджменту. *Управління змінами та інновації*, (1), 91–94. URL: http://cmi.politehnica.zp.ua/index.php/journal/article/view/21.

11. Шмиголь, Н. М., Коваленко, О. В., Коваленко, Е. В., & Антонюк, А. А. (2018). Обґрунтування необхідності створення транспортно-логістичних центрів в Україні.

12. Варламова, І. С., & Шмиголь, Н. М. (2017). Вибір моделі залежності екологічної стійкості. *European cooperation*, *9*(28), 65–73.