



## KNOWLEDGE MARKETING: n(P, C, S, V)'s MIX?

**Nadiia Artyukhova**,  <https://orcid.org/0000-0002-2408-5737>

PhD, Associated Professor, Sumy State University, Ukraine

**Jan Krmela**,  <https://orcid.org/0000-0001-9767-9870>

PhD, Associated Professor, University of Pardubice, Czech Republic

**Vladimira Krmelova**,  <https://orcid.org/0000-0002-3822-3416>

PhD, Associated Professor, Alexander Dubcek University of Trencin, Slovak Republic

**Corresponding author: Nadiia Artyukhova**, [n.artyukhova@pohnp.sumdu.edu.ua](mailto:n.artyukhova@pohnp.sumdu.edu.ua)

**Type of manuscript:** research paper

**Abstract:** *The work is devoted to the search for the optimal algorithm for implementing the process of promoting knowledge in the educational services market. The «product» of promotion is an educational program. Promotion of products of educational activities could be built along the general line «internal quality assurance of education - reviews of internal stakeholders - external quality assurance of education - reviews of external stakeholders - a business card of an educational product». When applied to an educational program as an object of knowledge marketing, a business card is a set of innovative features that could be used as the basis for implementing a particular strategy. In the frame of the work for describing the process of promoting the educational program abstract-logical method, the method of analogies, and the method of induction-deduction were used. A bibliometric analysis was carried out based on an array of bibliographic data of articles from the Scopus database using the VOSviewer tool to assess the possibility of combining different marketing mix models. The results of the bibliometric analysis show that the marketing mix model applies to the promotion of knowledge (educational program) as a product of the DIKW model. At the same time, the question of choosing a marketing mix strategy or justifying the need to combine these strategies remains open. As part of the work, a link was made between generating the knowledge model and promoting an educational program as a product of the DIKW model. Bibliometric analysis showed that using a single marketing mix strategy currently does not lead to success in product promotion. A combination of different strategy indicators is needed. At the same time, it is essential to establish the degree of significance of each indicator in the overall rating and to screen out (if necessary) individual indicators. A multi-level expert assessment determines the degree of significance of each indicator. Based on the results of this assessment, a specific set of indicators for this educational program and the dominant strategy, if any, are formed. A combined approach for promoting an educational program is developed based on an analysis of individual indicators and a multi-stage expert assessment of internal and external stakeholders.*

**Keywords:** bibliometric analysis, DIKW model, knowledge transfer, marketing mix, strategy, evaluation, expert review, SDG's.

**JEL Classification:** M31, O32, O34

**Received:** 02 June 2022

**Accepted:** 02 September 2022

**Published:** 30 September 2022

**Funding:** There is no funding for this research.

**Publisher:** Sumy State University

**Cite as:** Artyukhova, A., Krmela, J., & Krmelova, V. (2022). Knowledge Marketing: n(P, C, S, V)'s Mix? *Marketing and Management of Innovations*, 3, 182-189. <https://doi.org/10.21272/mmi.2022.3-16>



Copyright: © 2022 by the author. Licensee Sumy State University, Ukraine. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Introduction.** Forming a knowledge bank and its promotion is an urgent task outside of time and environment. The knowledge generation algorithm described by the DIKW (Data – Information – Knowledge – Wisdom) model (Yusof et al., 2018) must end with the «industrial implementation» of knowledge. The process of knowledge marketing could also be algorithmized, and the algorithm itself is optimized by considering the available tools. At the same time, the choice of a strategy for promoting knowledge as a «product» could be made in favor of different marketing mix approaches nP's (Oliveira and Machado Toaldo, 2015) or nC's (Wang, 2020).

Promotion of products of educational activities could be built along the general line «1: internal quality assurance of education - 2: feedback from internal stakeholders – 3: external quality assurance of education – 4: feedback from external stakeholders - 5: business card of the educational product» (item numbers – graph's peak numbers). When applied to an educational program as an object of knowledge marketing, a business card is a set of innovative features that could be used as the basis for implementing a particular strategy. In fact, in the research process, it is necessary to apply the Hamiltonian cycle (Hell et al., 2020), speaking in graph theory (Figure 1 a). Considering that all the above factors influence the business card of an educational product, the graph could be complicated by the presence of additional links, including two-way ones (Figure 1 b). Moving to a new top of the graph (6: promotion strategy or marketing mix) and then to a specific set of indicators of the chosen marketing mix strategy (7: P-marketing, 8: C-marketing) completes the life cycle of the educational program in this configuration (Figure 1 c,d). At the same time, the mutual influence of the marketing mix tools and the stages of the general line is observed, which forms the final form of the graph (Figure 1 e). After that (as expected by the systems of internal quality assurance of education), the structure of the educational program is revised, and the cycle is repeated.



**Figure 1. Graph of promotion of the product of educational activity (knowledge): a – Hamiltonian cycle; b – cross-links; c – transition to the marketing mix strategy; d – the relationship of strategies; e – the relationship of the strategy with the elements of the general line**

Sources: developed by the authors.

In the framework of this work, the analysis of the left side of the graph should answer two questions:

1. Could a «mix» of marketing mix strategies be used to promote an educational program as a «product» of the DIKW model?
2. What is the criterion for producing a mix of marketing mix strategies if the answer to the first question is yes?

The process of knowledge marketing is an indispensable attribute of the formation of a digital education environment (Liubchak et al., 2022; Simakhova et al., 2022), the achievement of sustainable development goals in terms of ensuring the quality of education (Artyukhov and Omelyanenko, 2021), the implementation of innovations (Artyukhov et al., 2021a), successful stories of managing educational processes (Bilan et al., 2022), effective quality assurance systems (Vasylieva et al., 2017; Leonov et al., 2018), open environment (Leonov et al., 2017) with proven knowledge assessment algorithms (Yarovenko et al., 2021), etc.

**Literature review.** In the dynamic market of educational services, marketing strategies must be adapted to the current conditions of the market (customers). Such an opinion is promoted in leading companies, which constantly increase their potential due to the explicit and implicit exchange of knowledge (Arnett and Wittmann, 2014). To be one step ahead of competitors, companies resort to various forms of «knowledge utilization» to obtain knowledge. The implementation of the processes of developing knowledge networks, solving customer problems, and possessing the absorptive capacity to understand and integrate customer knowledge, according to researchers (Diehr and Wilhelm, 2017), is a successful knowledge marketing strategy for knowledge-intensive SMEs. The first of this processes list is of particular interest to educational marketing processes.

One of the directions of successful study of educational services marketing is presented in work (Bolisani and Scarso, 2012). The authors proposed a combined model for studying this phenomenon based on data from the knowledge management literature and the marketing literature that deals with the marketing of «physical» products. In part, such a combination can be carried out based on bibliometric analysis. The importance of validating various hypotheses about the success of knowledge marketing is noted in (Chen, 2012), which shows multiple activities in knowledge marketing using the example of e-retail. Such hypotheses need to be tested concerning the marketing of educational products.

However, the studies mentioned above concern the interaction of enterprises among themselves and ways of increasing competitiveness in the market they occupy. Some problems require further study in this niche. It has not been studied as widely as the marketing of knowledge at the enterprise and between enterprises.

There is an opinion (Ottesen and Grønhaug, 2004) that academic knowledge marketing (a theoretical approach) is of limited use in practice. Therefore, it is crucial to «embed» the entrepreneurial university's practice-oriented approach into the knowledge marketing process.

The main hypothesis needs to be confirmed is that the educational marketing mix is a «double» mix. It combines a set of P-, C-, S-, and V-mix instruments and instruments from various mixes in an arbitrary combination. At the same time, the literature describes the number of indicators of each type of marketing mix that could expand beyond.

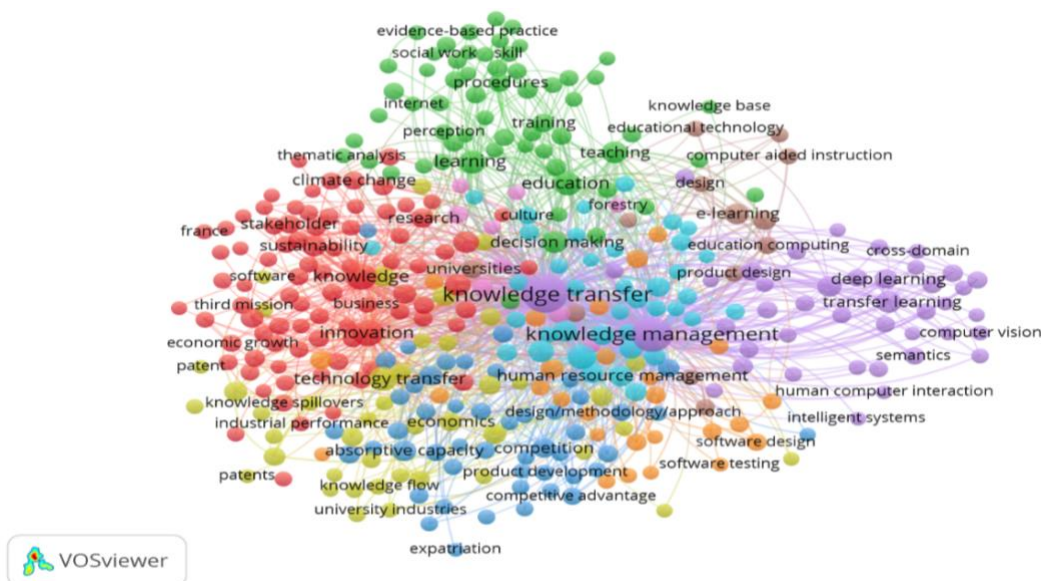
**Methodology and research methods.** Building a strategy for promoting knowledge in the educational services market should consider various models and, in some cases, combine them. To assess the possibility of combining different models, a bibliometric analysis was carried out based on the array of bibliographic data of articles from the Scopus database using the VOSviewer tool. The algorithm for conducting bibliometric analysis is based on classical approaches (Donthu et al., 2021):

- in the first stage of bibliometric analysis, the task was to identify the marketing stage in knowledge transfer. In the second stage of the bibliometric analysis, the task was to determine the relationship between nP's and nC's marketing mix;
- in the second stage of the bibliometric analysis, the task was to determine the relationship between nP's and nC's marketing mix.

The search query «knowledge transfer» found 17,640 articles. The search query was subject to a time limit (2016-2021), and a limitation by industry (Decision Sciences; Social Sciences; Business, Management, and Accounting; Economics, Econometrics and Finance); 3553 articles were received. For analysis, 481 keywords were selected with a frequency of occurrence in the search query results at least eight times.

**Results.** The results of the first stage of bibliometric analysis are presented in Figure 2.

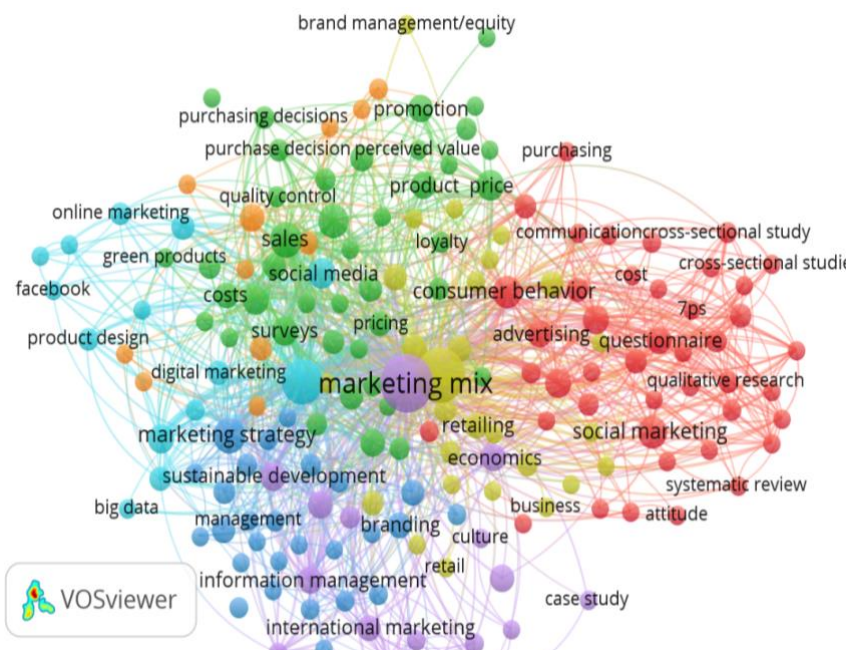
It should be noted that the keyword «marketing» appears in the search results but is not part of any cluster in terms of association with other keywords. This fact suggests that knowledge as a product at the system level is not an object of marketing. Thus, the relevance of studying this direction is confirmed.



**Figure 2. Keyword map for the query «knowledge transfer»**

Sources: developed by the authors (tool – VOSviewer) based on Scopus data.

For the second stage of the bibliometric analysis, 1532 articles were taken for the key query «marketing mix», published in 2013-2020. The analysis was carried out on 245 keywords with a frequency of occurrence in the search query results at least five times. The keyword map is shown in Figures 3 and 4.



**Figure 3. Keyword map for the query «marketing mix» (general map)**

Sources: developed by the authors (tool – VOSviewer) based on Scopus data.

The main conclusions based on the results of the bibliometric analysis:

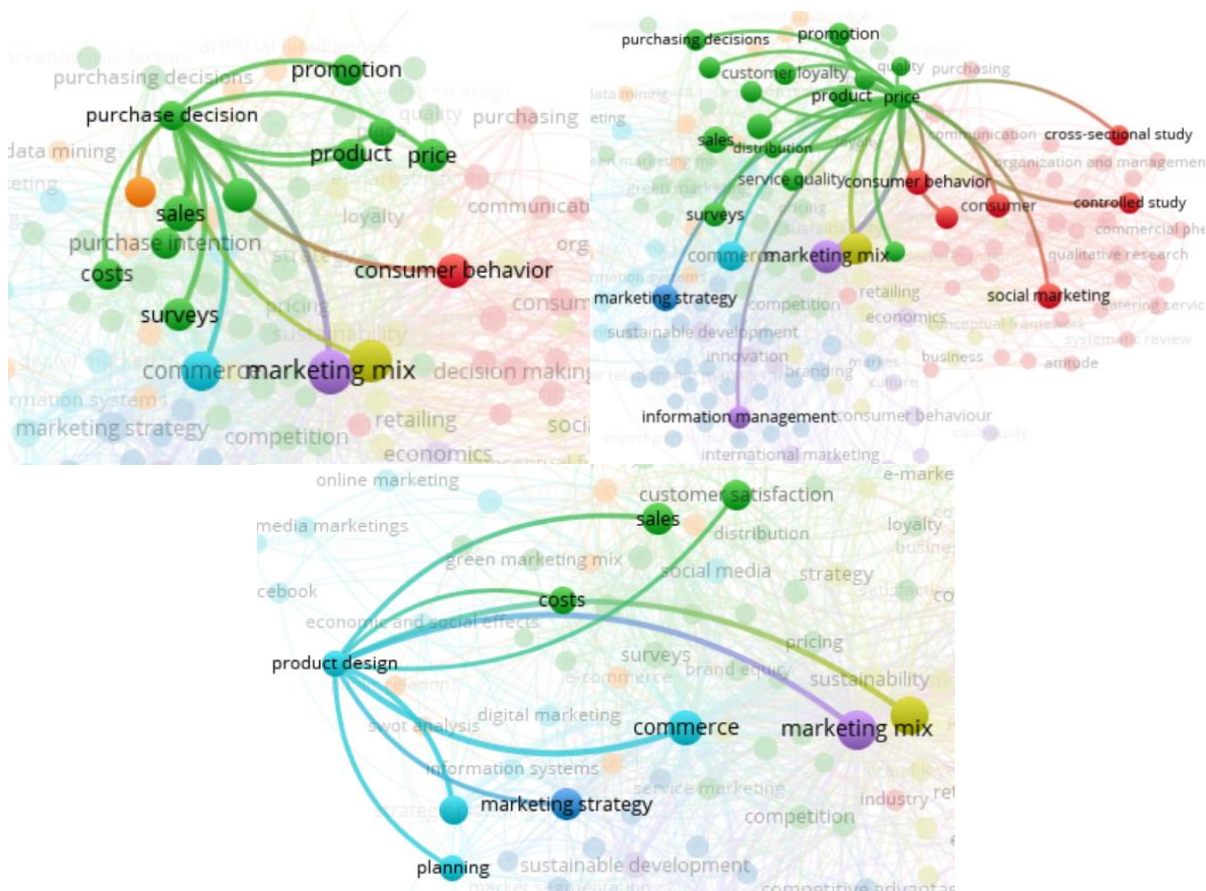
1. Marketing mix operates with the concepts of «data», «information», and «knowledge», which are inherent in the DIKW model. The term «wisdom» in the marketing mix is replaced by the word «strategy». Thus, there is a possibility to discuss the prospect of successfully «embedding» the marketing mix strategy into the DIKW model.
2. Keyword clusters include nP's and nC's marketing mix elements. This fact allows us to assert that no strategy prevails in the literature. Instead, it discusses a combination of strategies in each case (Figure 5).

3. The analysis of keywords in different time intervals of the publications shows that over the past five years, there has been a tendency to form a «team» marketing mix strategy due to a reasonable choice of evaluation indicators that most effectively assess the degree of success of product promotion to the market.

4. Analysis of all keywords (the minimum frequency of occurrence in the search query results is at least two times) shows that the choice of strategy is not limited to nP's and nC's marketing mix. For example, the results of the analysis revealed the presence of such phrases as «websites» «online system», «scoring system» «validity» and «service value» which are typical for 4 V's and 4 S's marketing mix (Londhe, 2014).



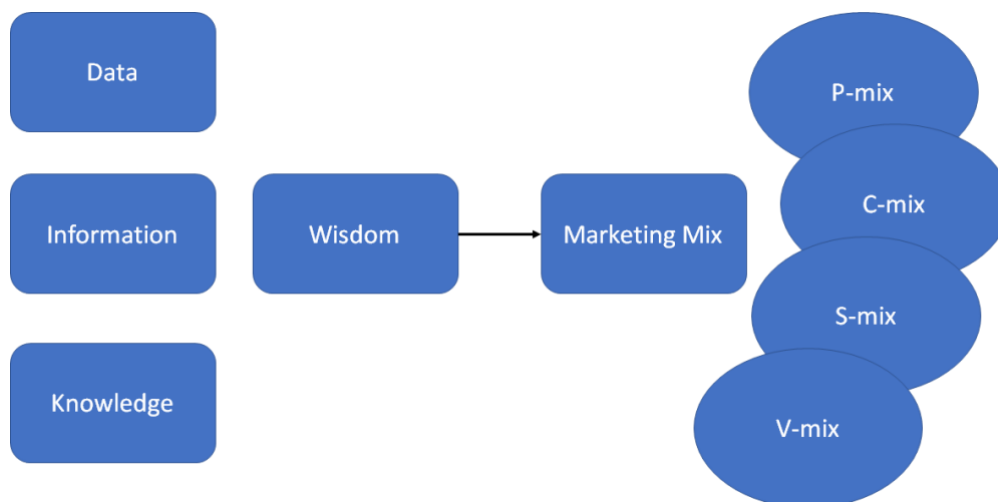
**Figure 4. Keyword map for the query «marketing mix» (chronological map)**  
 Sources: developed by the authors (tool – VOSviewer) based on Scopus data.



**Figure 5. Clusters with combinations of marketing mix strategies**  
 Sources: developed by the authors (tool – VOSviewer) based on Scopus data.

The results of the bibliometric analysis show that the marketing mix model applies to the promotion of knowledge (educational program) as a product of the DIKW model. At the same time, the question of choosing a marketing mix strategy or justifying the need to combine these strategies remains open.

Based on the bibliometric analysis, a scheme for transforming knowledge «capital – product» (DIKW model - marketing mix model) is proposed, presented in Figure 6.



**Figure 6. From DIKW to MM**

Sources: developed by the authors.

The main question for the right side of this figure is how to use the elements of different marketing mix strategies, and should all elements be used? Educational programs have their specifics as a «product»:

1. Requires continuous improvement of the educational program between the previous and next versions of the product.
2. The choice of the educational program's configuration is the university's entire decision.
3. The evaluation of the quality of the educational program and its prospective attractiveness is carried out by consumers simultaneously from inside and outside. At the same time, achieving sustainable development goals (Artyukhov et al., 2021b) is also considered part of the educational program.

Thus, a multi-stage expert evaluation and ranking are required to select a set of effective indicators for assessing an educational program's attractiveness (as seen above, the author chose the path of combining elements of various marketing mix strategies).

The process of selecting indicators from various strategies was carried out in the following way:

1. Expert evaluation of the educational program using Net Promoter Score (Baehre et al., 2022). Findings of customer loyalty and their willingness to recommend the program.
2. Formation of a combined list of indicators from each strategy.
3. Bibliometric analysis by keyword (phrase) describes the educational program and selects keywords relevant to indicators from the combined list.
4. Expert evaluation using a quality pie chart (analogies with the quality assessment of technical systems). The evaluation is carried out separately by internal and external stakeholders.
5. Evaluation of the consistency of expert opinions based on the Kendall concordance coefficient (Field, 2014).
6. Ranking of indicators for which a satisfactory agreement was obtained. Direct ranking (comparison of an educational program with similar indicators of similar programs at other universities, obtained as a result of benchmarking) with the possibility of pairwise comparison. Each indicator is assigned an individual coefficient of significance, determined based on expert assessments.
7. Using the ranking results as a scale for the effectiveness of applying the marketing mix strategy indicators and selecting the predominant marketing mix strategy.

Thus, a combined strategy for promoting an educational program is formed based on an analysis of individual indicators (not all) and a multi-stage expert assessment of internal and external stakeholders.

**Conclusions.** As part of the work, a link was made between modeling knowledge generation and promoting an educational program as a product of the DIKW model. Bibliometric analysis showed that using a single marketing mix strategy currently does not lead to success in product promotion. A combination of

different strategy indicators is needed. At the same time, it is crucial to establish the degree of significance of each indicator in the overall rating and to screen out (if necessary) individual indicators. A multi-level expert assessment determines the degree of importance of each indicator. Based on the results of this assessment, a specific set of indicators for this educational program and the dominant strategy, if any, are formed.

**Acknowledgments.** This research was funded by grants from the Ministry of Education and Science of Ukraine «Reforming the lifelong learning system in Ukraine for the prevention of the labor emigration: a co-competition model of institutional partnership» (reg. n. 0120U102001), «Convergence of economic and educational transformations in the digital society: modeling the impact on regional and national security» (reg. n. 0121U109553), «Business – Education – Science co-competition: institutional and economic models of innovation transfer for national security and sustainable development» (reg. n. 0122U000772).

**Author Contributions:** conceptualization, N. A.; methodology, N. A.; validation, N. A., J. K., and V. K., and D. O; formal analysis, N. A. and D. O; investigation, N. A.; data curation, N. A.; writing-original draft preparation, N. A.; writing-review and editing, J. K., V. K. and D. O; visualization, N. A.; supervision, N. A.; project administration, N. A.

**Conflicts of Interest:** Authors declare no conflict of interest.

**Data Availability Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

## References

- Arnett, D. B., & Wittmann, C. M. (2014) Improving marketing success: The role of tacit knowledge exchange between sales and marketing. *Journal of Business Research*, 67(3), 324–331. [[Google Scholar](#)] [[CrossRef](#)]
- Artyukhov, A., & Omelyanenko, V. (2021). Methodical Aspects of Innovation Cooperation Processes Educations and R&D Effects Estimations. *11th International Conference on Advanced Computer Information Technologies*, 250–254. [[Google Scholar](#)] [[CrossRef](#)]
- Artyukhov, A., Omelyanenko, V., & Prokopenko, O. (2021a). University Technology Transfer Network Structure Development: Education and Research Quality Issues. *TEM Journal*, 10(2), 607–619. [[Google Scholar](#)] [[CrossRef](#)]
- Artyukhov, A., Volk, I., Vasylieva, T., & Lyeonov, S. (2021b). The role of the university in achieving SDGs 4 and 7: a Ukrainian case. *E3S Web of Conferences* 250, 04006. [[Google Scholar](#)] [[CrossRef](#)]
- Baehre, S., O'Dwyer, M., O'Malley, L., & N. Lee (2022). The use of Net Promoter Score (NPS) to predict sales growth: insights from an empirical investigation. *Journal of the Academy of Marketing Science*, 50, 67–84. [[Google Scholar](#)] [[CrossRef](#)]
- Bilan, S., Šuleř, P., Skrynyk, O., Krajňáková E., & Vasilyeva, T. (2022). Systematic bibliometric review of artificial intelligence technology in organizational management, development, change and culture. *Business: Theory and Practice*, 23(1), 1–13. [[Google Scholar](#)] [[CrossRef](#)]
- Bolisani, E., & Scarso, E. (2012). Knowledge marketing: Issues and prospects. *Proceedings of the European Conference on Knowledge Management, I*, 100–107. [[Google Scholar](#)]
- Chen, L. Y. (2012). A knowledge marketing model: Determinants of organisational resource-based capabilities on e-retail performance. *International Journal of Business Information Systems*, 9(1), 89–107. [[Google Scholar](#)] [[CrossRef](#)]
- Diehr, G., & Wilhelm, S. (2017). Knowledge marketing: How can strategic customers be utilised for knowledge marketing in knowledge-intensive SMEs? *Knowledge Management Research & Practice*, 15, 12–22. [[Google Scholar](#)] [[CrossRef](#)]
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. [[Google Scholar](#)] [[CrossRef](#)]
- Field, A. P. (2005). Kendall's coefficient of concordance. *Encyclopedia of Statistics in Behavioral Science*, 2, 1010–11. [[Google Scholar](#)]
- Hell, P., Nishiyama, H., & Stacho, L. (2020). Hamiltonian cycles in covering graphs of trees. *Discrete Applied Mathematics*, 282, 271–281. [[Google Scholar](#)] [[CrossRef](#)]
- Leonov, S. V., Vasilyeva, T. A., & Makarenko, I. O. (2017). Modern methodical approaches to the evaluation of corporate reporting transparency. *Scientific Bulletin of Polissia*, 1(2(9)), 185–190. Retrieved from [[Link](#)]

Leonov, S. V., Vasilyeva, T. A., & Shvindina, H. O. (2018). Methodological approach to design the organizational development evaluation system. *Scientific Bulletin of Polissia*, 2(3(11)), 51–56. Retrieved from [\[Link\]](#)

Liubchak, V. O., Zuban, Y. O., & Artyukhov, A. E. (2022). Immersive learning technology for ensuring quality education: Ukrainian university case. *CEUR Workshop Proceedings*, 3085, 336–354. [\[Google Scholar\]](#)

Londhe, B. R. (2014). Marketing Mix for Next Generation Marketing. *Procedia Economics and Finance*, 11, 335–340. [\[Google Scholar\]](#) [\[CrossRef\]](#)

Oliveira, M. G., & Machado Toaldo, A.M. (2015). New times, new strategies: proposal for an additional dimension to the 4 P'S for E-commerce dot-com. *Journal of Information Systems and Technology Management* 12(1), 107–124. [\[Google Scholar\]](#) [\[CrossRef\]](#)

Ottesen, G. G., & Grønhaug, K. (2004). Barriers to practical use of academic marketing knowledge. *Marketing Intelligence & Planning*. [\[Google Scholar\]](#) [\[CrossRef\]](#)

Simakhova, A. O., Artyukhov A. E., & Shmarlouskaya, H. A. (2022). Problematic issues of digitalization of education in Eastern Europe. *CEUR Workshop Proceedings*, 3085, 1–15. [\[Google Scholar\]](#) [\[CrossRef\]](#)

Vasylieva, T. A., Leonov, S. V., Petrushenko, Y. M., & Vorontsova, A. S. (2017). Investments in the system of lifelong education as an effective factor of socio-economic development. *Financial and Credit Activity Problems of Theory and Practice*, 2(23), 426–436. [\[Google Scholar\]](#)

Wang, Y. (2020). Research on the Effect of 4C + 2S to Customer Perceived Value in Scene Marketing of Clothing Industry in China. *Open Journal of Business and Management*, 8, 628–638. [\[Google Scholar\]](#) [\[CrossRef\]](#)

Yarovenko, H., Bilan, Y., Lyeonov, S., & Mentel, G. (2021). Methodology for assessing the risk associated with information and knowledge loss management. *Journal of Business Economics and Management*, 22(2), 369-387. [\[Google Scholar\]](#) [\[CrossRef\]](#)

Yusof, W. S. E. Y. W., Zakaria, O., Zainol, Z., & Ananthan, S. (2018). DIKW Application on Knowledge Based Framework with Situational Awareness. *International Journal of Academic Research in Business and Social Sciences*, 8(6), 1110–1120. [\[Google Scholar\]](#) [\[CrossRef\]](#)

**Надія Артюхова**, PhD, доцент, Сумський державний університет, Україна

**Ян Крмела**, PhD, доцент, Пардубіцький університет, Чеська республіка

**Владимира Крмелова**, PhD, доцент Тренчанський університет Александра Дубчека в Тренчині, Словаччина

**Маркетинг знань: мікс п(P, C, S, V)?**

Стаття присвячена пошуку оптимального алгоритму реалізації процесу просування знань на ринку освітніх послуг. «Продуктом» просування є освітня програма. Просування продуктів освітньої діяльності можна будувати за загальною лінією «внутрішнє забезпечення якості освіти – відгуки внутрішніх стейкхолдерів – зовнішнє забезпечення якості освіти – відгуки зовнішніх стейкхолдерів – візитна картка освітнього продукту». У застосуванні до освітньої програми, як об'єкта маркетингу знань, візитна картка – це набір інноваційних ознак, які можуть бути покладені в основу реалізації певної стратегії. В рамках роботи, для опису процесу просування освітньої програми використано абстрактно-логічний метод, метод аналогій та метод індукції-дедукції. Бібліометричний аналіз проводився на основі масиву бібліографічних даних статей, індексованих у базі даних Scopus за допомогою інструменту VOSviewer. Це дозволило оцінити можливості поєднання різних моделей маркетинг-міксу. Результати бібліометричного аналізу засвідчили, що модель маркетинг-мікс застосовується до просування знань (освітньої програми) як продукту моделі DIKW. Водночас відкритим залишається питання вибору стратегії маркетинг-міксу чи обґрунтування необхідності використання комбінації цих стратегій. У рамках роботи було проведено зв'язок між моделлю генерації знань та просуванням освітньої програми як продукту моделі DIKW. Бібліометричний аналіз показав, що використання єдиної стратегії маркетинг-міксу наразі не призводить до успіху в просуванні товару. Необхідна комбінація різних індикаторів стратегії. При цьому важливо встановити ступінь значущості кожного показника в загальному рейтингу та відсіяти (за потреби) окремі показники. Багаторівнева експертна оцінка визначає ступінь значущості кожного показника. За результатами цієї оцінки формується певний набір показників для даної освітньої програми та домінуюча стратегія, якщо така є. За результатами дослідження розроблено комбінований підхід до просування освітньої програми на основі аналізу окремих показників та багатоетапної експертної оцінки внутрішніх і зовнішніх стейкхолдерів.

**Ключові слова:** бібліометричний аналіз, модель DIKW, трансфер знань, маркетинг-мікс, стратегія, оцінка, експертний погляд, ЦСП.