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APPLICATION OF THE SIMULATION MODELING METHOD FOR SOLVING CONTENT MARKETING AUTOMATION TASKS

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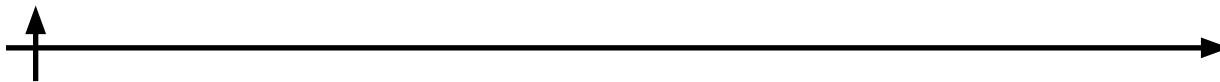
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Abstract. The paper describes the creation of a simulation model of the activity of a content manager to increase the effectiveness of marketing, and also defines the relationship of content marketing with Internet marketing in general. Simulation modeling in the AnyLogic program was used as the main research method. The literature sources on the topic of content analysis were analyzed, the processes in the work of a content manager that are subject to automation were highlighted. A simulation model of automation of the content manager's activity in the AnyLogic program was also developed and the economic efficiency of the implemented measures was justified. The scientific novelty of the proposed method lies in the fact that the model takes into account the need to create reports on promotions, as well as the need to conduct SEO promotion and evaluate the effectiveness of advertising on different Internet platforms: yandex.direct and google.awards. The results of the research can be used by IT specialists to create and improve software products.

Keywords: simulation modeling, content analysis, Internet marketing, marketing automation, AnyLogic

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ПРИМЕНЕНИЕ МЕТОДА ИМИТАЦИОННОГО МОДЕЛИРОВАНИЯ ДЛЯ РЕШЕНИЯ ЗАДАЧ АВТОМАТИЗАЦИИ КОНТЕНТ-МАРКЕТИНГА

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Аннотация. В работе описано создание имитационной модели деятельности контент-менеджера для повышения эффективности маркетинга, а также определена связь контент-маркетинга с интернет-маркетингом в целом. В качестве основного метода исследования применялось имитационное моделирование в программе AnyLogic. Были проанализированы литературные источники по теме контент-анализа, выделены процессы в работе контент-менеджера, подлежащие автоматизации. Также была разработана имитационная модель автоматизации деятельности контент-менеджера в программе AnyLogic и обоснована экономическая эффективность внедряемых мер. Научная новизна предлагаемого метода заключается в том, что модель учитывает необходимость создания отчетов по рекламным акциям, а также необходимость ведения seo-продвижения и оценки эффективности рекламы на разных интернет-платформах: яндекс.директ и google. awards. Результаты исследования могут быть использованы it-специалистами для создания и усовершенствования программных продуктов.

Ключевые слова: имитационное моделирование, контент-анализ, интернет-маркетинг, автоматизация маркетинга, AnyLogic

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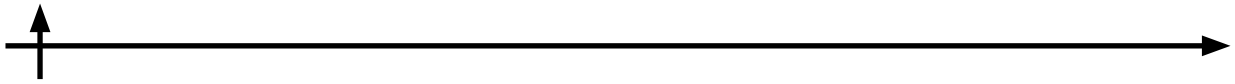
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Introduction

Content marketing refers to marketing techniques that allow you to create, distribute and analyze information that allows you to sell products by increasing customer trust and involving them in the company's information field. The objectives of content marketing include: increasing the sales of goods, improving brand awareness of the company, informing customers about the company's services or products.

In this study, we will focus on such a part of content marketing as social media marketing (hereinafter referred to as SMM - social media marketing), however, it should be noted that this type of marketing is closely intertwined with other types of digital marketing and, above all, Internet marketing in general (Chaffey, 2013). The line between them is very conditional. When studying content in SMM, we study content as a whole, since the same content is often used in other areas of marketing (Ahearne, 2007).

We will also be primarily interested in automating the work of a content manager, whose functions can also be attributed to the work of an Internet marketer. The work functions of a content manager and an internet marketer often overlap. For example, a content manager is often responsible for SEO promotion of content on social networks in the Yandex and Google



search engines.

The following figure shows the interaction between content marketing and social media marketing.

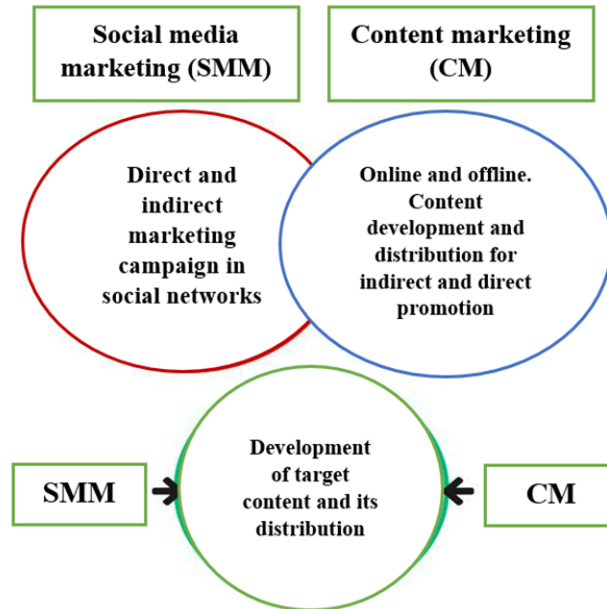


Fig. 1. Interconnection between SMM and content marketing

The distribution of content relevant to the target audience is inseparable from social networks, as a medium that is becoming increasingly popular and can compete in audience reach with television. Thus, the choice of SMM marketing for subsequent research is due to the high demand for content analysis in this area (Biemans, 2010).

Among the SMM marketing tools we can list:

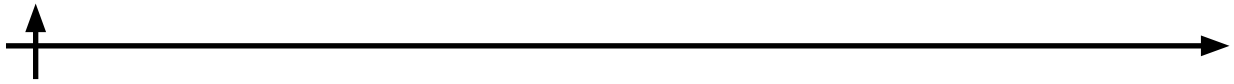
1. Blogging (creating and maintaining various blogs);
2. Maintaining a thematic community;
3. Targeted advertising on social networks;
4. Direct marketing – communication with clients on behalf of the company on forums, communities, comments under posts and other possible places;
5. Monitoring mentions of the company on social networks to deal with negativity.

And also many other tools. What these tools have in common is their relatively low cost with minimal costs and long periods of time before obtaining a result, which at the same time brings a positive and long-term effect (Donath, 1995).

An article by Finnish researchers Joel Jarvinen and Heini Taiminen, “Using Automation for Content Marketing in the B2B Market,” states that in large online agencies, a marketer can spend up to 17 working hours per week writing various types of reporting (Bhattacharyya, 2010).

Materials and Methods

Despite the fact that there are systems for automating the work of marketers and content managers, as a rule they do not include work on social networks or such frequently used systems as Yandex Direct or Google Awards at the same time. Whereas a content manager often has to work simultaneously in both Yandex and Google. A problem arises due to the inability to control the activity of advertising campaigns; the system itself runs ads and does not always do this effectively, which is why there is a decrease in conversion (Batt, 2012).



In addition to the need to compile numerous reports, as well as use various services for tracking the effectiveness of advertising and product promotion, content managers complain about the need to constantly monitor promotions on social networks (Buttle, 2009). Timely automated tracking of promotions or reminders about the end of these promotions would also help content managers reduce their time costs.

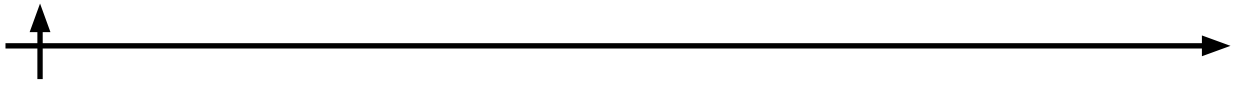
To better understand the relevance of the task of automating the work of a content manager or Internet marketer, a patent search was conducted in the field of content marketing automation. During the patent search, scientific, technical and patent information was studied:

1. Description of inventions for patents
2. Formula of invention
3. Classification
4. Drawings
5. Applications for inventions
6. Abstracts of foreign inventions
7. Commercial potential of the technology
8. Trademarks for the technology in question

About 100 patents were studied; an example of patent search work can be found in Table 1.

Table 1. Patent search results

Patent search				
Country and company owner	Patent number	Patent name	Patent Description	Search site
Google Inc, US	CA2634039A1	SEGMENT CONTENT OPTIMIZATION DELIVERY SYSTEM AND METHOD	The method includes retrieving by a processor the respective use data for the population, from the plurality of marketing systems, determining by the processor if the respective use data exceeds a threshold for particular behavioral pattern of interest, for the respective use data, determining by the processor a unique identifier for each user device of the use data (Christodoulides, 2009)	https://worldwide.espacenet.com/
SIRIUSDECISIONS INC, US	WO2013173545A1	METHOD AND SYSTEM FOR ASSESSING BUSINESS-TO-BUSINESS SALES AND MARKETING PERFORMANCE DATA	The present invention relates to the assessment of performance data in the field of business- to-business sales and marketing. More specifically, the present invention relates to computer-implemented methods and systems for assessing performance data relating to an organization's ability create systematic, predictable and measurable demand (Montgomery, 2003).	https://worldwide.espacenet.com/
CATHOLIC UNIV KOREA IND	KR20210071522A	B2B MARKETING INTEGRATED MANAGEMENT SYSTEM	As an example, the task to be solved according to the embodiment of the present invention can easily cope with the corporate environment, easily change and maintain permissions required for security, etc. (Beverland, 2012).	https://worldwide.espacenet.com/



As a result of the patent search, the following conclusions were made:

1. The general patentability of the proposed method is noted. In general, marketing automation systems are present in the patent search systems studied, but it was not possible to find content marketing automation systems that would pay much attention to reducing the time for compiling reports from various systems, such as Yandex, Google Words and social networks at the same time. Although certain methods for automating the work of Internet marketers and content managers are present in the databases in the form of patents (Adamson, 2012).

2. Taking into account the patent search, as well as the cited Russian-language and foreign sources, we can note the commercial potential of the technology, which can be successfully used for large companies and Internet agencies that run marketing companies, using the entire arsenal of content creation and promotion (Jarvinen, 2016).

3. Trademarks and combinations of words for the technology in question were found with the words “marketing” and “automation”, but no trademarks with the combination “marketing automation” were found (Donath, 1999).

In order to reduce the time spent by content managers and ensure the unification of their work in various areas of business, it was decided to use the simulation modeling method. Having great variability in terms of solving the problems facing the researcher, this method allows you to adapt it for various areas of business, as well as to calculate in advance the effectiveness of the implemented measures to automate the activities of marketers. The latter can be used both when creating new software products and when selecting existing ones.

The AnyLogic program was chosen as the main modeling tool. After that, it became possible to solve the main tasks of the study:

1. Select processes to be automated.
2. Determine key indicators and their values for these processes.
3. Build a model for automating the work of Internet marketers.
4. Determine the economic efficiency of the measures being implemented.

Results and Discussion

As part of solving the first task, based on the data provided, we selected the processes that we want to automate:

1. Monitoring SEO optimization services (Yandex Direct, Google Words).
2. Maintaining reports on contextual advertising on the Internet.
3. Tracking the start and end dates of promotions on social networks (Dubois, 2005).

As part of the solution of the second task, the key indicators of these processes were identified, which were collected in a table as variables of the future model, and the interrelations of the model variables were indicated. Table 2 presents the symbols of the elements used (Easton, 2010).

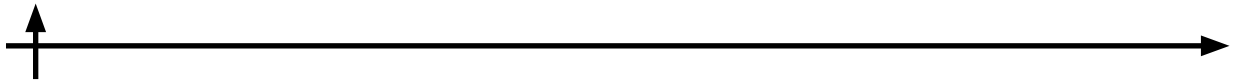


Table 2. Symbols of model elements

Designation	Factor
X1	Wasting time tracking SEO before implementation
X2	Wasting time tracking the CEO after implementation
X3	Reducing time in
X4	Waste of time reporting on context before implementation
X5	Wasting time on post-implementation context reporting
X6	Reducing time in
X7	Wasting time tracking the end of the promotion before implementation
X8	Wasting time tracking the end of the promotion after implementation
X9	Reducing time in
Y1	Time costs of an Internet marketer

Table 2 shows the relationship between the elements. The following are formulas for calculating dynamic variables and accumulators, as well as the values of statistical variables (Grinko, 2019). Since, on average, the implementation of a particular function (writing a report) takes 1 working hour, hours are taken as a unit of time.

Table 3. Relationship between model variables

Endogenous Variables	Exogenous variables		
Y1	X1	X2	X3

The marketer's time costs will be calculated using the formula:

$Y1 = X3, X6, X9$. $X = 100\% - 100\%/z$, where $z = x1/x2$, where $x1$ is the time that was spent before the introduction of automation, and $x2$ is the time that was spent after the implementation (Dennis, 2007).

Table 3 presents the values of statistical variables. From the data presented, it can be seen that the largest items of time spent by an Internet marketer are the costs of tracking advertising campaigns in SEO (Yandex.Direct, Google Words) (Cheporova, 2019).

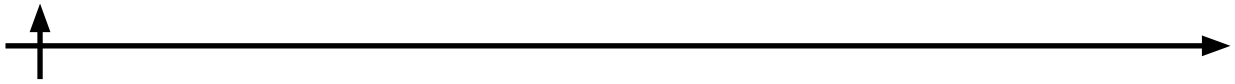
Table 4. Values of statistical variables of the model

Variable	Value	Unit measurements
X1	87.5	Hours
X2	16	Hours
X3	2	Hours
Y1(X3, X6, X9)	95.23 98.44 50	%

The marketer's time costs will be calculated using the formula:

$Y1 = X1, X2, X3$. $X = 100\% - 100\%/z$, where $z = x1/x2$, where $x1$ is the time that was spent before the introduction of automation, and $x2$ is the time that was spent after the implementation.

An Internet marketer agent and an indicator of overall marketing effectiveness have also been introduced, which directly correlates with a reduction in the time spent by an Internet



marketer. In this work, we use the concepts of Internet marketer and content manager as synonyms (Cooper, 2007; Kotik, 2020; Gimadeev and Abdukhalilova, 2023).

To solve the third research problem, a simulation model was created in the Anylogic software product.

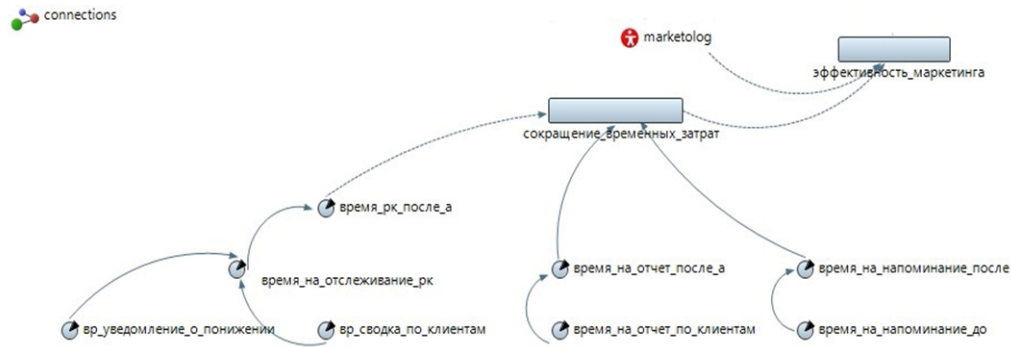


Fig. 2. Simulation model for automating the work of a content manager

Finally, as part of solving the fourth and last task of this work, the efficiency parameters of implementing a model for automating the work of a content manager or Internet marketer were calculated.

Table 5. Efficiency of implementing a content management automation system

Name	Before automation	After automation	%	Reduced/Result
Tracking the effectiveness of management of the advertisement	87.5	4.17	95.23	18 228.44
Making report	16	0.25	98.44	3 445.31
End of promotion	2	1	50	50
Other effects from the introduction of automation				Monitoring the work of Internet marketers; Increased customer loyalty

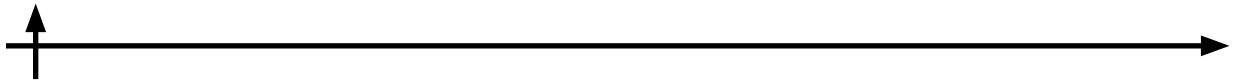
Conclusion

As part of the research, it became clear that the proposed method of automating the activities of a content manager minimizes the time spent on tracking the effectiveness of advertising campaigns in SEO and contextual advertising, drawing up reports, and also informing specialists about the end of promotions for a specific client.

The objectives of the study were successfully completed. The proposed model, thanks to the flexible software tool AnyLogic, can be supplemented with a large number of parameters and variables that can increase the effectiveness of marketing activities.

REFERENCES

- Adamson B., Dixon M.** 2012. The end of solution sales. *Harvard Business Review*, 90(7–8), 60–68.
- Ahearne M., Hughes D.** 2007. Why sales reps should welcome information technology: Measuring the impact of CRM-based IT on sales effectiveness. *International Journal of Research in Marketing*, 24(4), 336–349.
- Batt P.** 2012. Measures and measurement: Process and practise. *Industrial Marketing Management*, 41(3), 379–384.
- Beverland M.** 2010. What makes a good case study? A positivist review of qualitative case



research published in *Industrial Marketing Management*. *Industrial Marketing Management*, 39(1), 56–63.

Bhattacharyya B. 2014. Improving inventory demand forecasting by using the sales pipeline: A case study. *Journal of Business Forecasting*, 33(1), 7–11.

Biemans W., Brencic M. 2010. Marketing–sales interface configurations in B2B firms. *Industrial Marketing Management*, 39(2), 183–194.

Buttle F. 2009. *Customer relationship management: Concepts and technologies* (2nd ed.). London: Taylor & Francis.

Chaffey D., Smith P. 2013. *Emarketing excellence: Planning and optimizing your digital marketing* (4th ed.). London: Taylor & Francis.

Cheporova G. E., Tsurko O. 2019. Introduction of Internet marketing in modern business. *Actual problems and prospects of economic development*, 272–273.

Christodoulides G. 2009. Branding in the post-internet era. *Marketing Theory*, 9(1), 144.

Cooper M., Budd. 2007. Tying the pieces together: A normative framework for integrating sales and project operations. *Industrial Marketing Management*, 36(2), 173–182.

Dennis C., Merrilees B., Jayawardhena C. 2009. E-consumer behaviour. *European Journal of Marketing*, 43(9/10), 1121–1139.

Donath B. 1999. Quality information leads to quality leads. *Marketing News*, 33(17), 11.

Donath B., Crocker R., Dixon C. 1995. *Managing sales leads: How to turn every prospect into a customer*. Lincolnwood, IL: NTC Business Books.

Dubois A., Gibbert M. 2010. From complexity to transparency: Managing the interplay between theory, method and empirical phenomena in IMM case studies. *Industrial Marketing Management*, 39(1), 129–136.

Easton G. 2010. Critical realism in case study research. *Industrial Marketing Management*, 39(1), 118–128.

Gimadeev G., Abdukhalilova L. 2023. From like to sales: to the question of automation of lead generation process in social networks and lead quality assessment. *Technoeconomics*, 2, 3 (6), 28–43. DOI: <https://doi.org/10.57809/2023.2.3.6.3>

Grinko O. 2019. The content marketing funnel. *Science and innovation*, 9, 53–57.

Jarvinen J., Taiminen H. 2016. Harnessing marketing automation for B2B content marketing. *Industrial Marketing Management*. URL: https://www.researchgate.net/publication/280875581_Harnessing_marketing_automation_for_B2B_content_marketing (accessed: 19.01.2023).

Kotik V. 2020. Using AnyLogic software in simulation modeling. *Young scientist*, 51 (341), 13–15.

Montgomery A., Srinivasan K. 2003. Learning about customers without asking. The power of one—Leverage value from personalization technologies, 122–143.

Simulation modeling. URL: <https://www.anylogic.ru/use-of-simulation> (accessed: 19.01.2023).

СПИСОК ИСТОЧНИКОВ

Adamson B., Dixon M. 2012. The end of solution sales. *Harvard Business Review*, 90(7–8), 60–68.

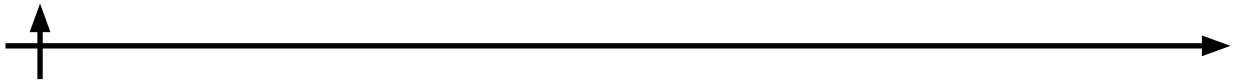
Ahearne M., Hughes D. 2007. Why sales reps should welcome information technology: Measuring the impact of CRM-based IT on sales effectiveness. *International Journal of Research in Marketing*, 24(4), 336–349.

Batt P. 2012. Measures and measurement: Process and practise. *Industrial Marketing Management*, 41(3), 379–384.

Beverland M. 2010. What makes a good case study? A positivist review of qualitative case research published in *Industrial Marketing Management*. *Industrial Marketing Management*, 39(1), 56–63.

Bhattacharyya B. 2014. Improving inventory demand forecasting by using the sales pipeline: A case study. *Journal of Business Forecasting*, 33(1), 7–11.

Biemans W., Brencic M. 2010. Marketing–sales interface configurations in B2B firms. *Industrial Marketing Management*, 39(2), 183–194.



- Buttle F.** 2009. Customer relationship management: Concepts and technologies (2nd ed.). London: Taylor & Francis.
- Chaffey D., Smith P.** 2013. Emarketing excellence: Planning and optimizing your digital marketing (4th ed.). London: Taylor & Francis.
- Christodoulides G.** 2009. Branding in the post-internet era. *Marketing Theory*, 9(1), 144.
- Cooper M., Budd.** 2007. Tying the pieces together: A normative framework for integrating sales and project operations. *Industrial Marketing Management*, 36(2), 173–182.
- Dennis C., Merrilees B., Jayawardhena C.** 2009. E-consumer behaviour. *European Journal of Marketing*, 43(9/10), 1121–1139.
- Donath B.** 1999. Quality information leads to quality leads. *Marketing News*, 33(17), 11.
- Donath B., Crocker R., Dixon C.** 1995. Managing sales leads: How to turn every prospect into a customer. Lincolnwood, IL: NTC Business Books.
- Dubois A., Gibbert M.** 2010. From complexity to transparency: Managing the interplay between theory, method and empirical phenomena in IMM case studies. *Industrial Marketing Management*, 39(1), 129–136.
- Easton G.** 2010. Critical realism in case study research. *Industrial Marketing Management*, 39(1), 118–128.
- Gimadeev G., Abdukhalilova L.** 2023. From like to sales: to the question of automation of lead generation process in social networks and lead quality assessment. *Technoeconomics*, 2, 3 (6), 28–43. DOI: <https://doi.org/10.57809/2023.2.3.6.3>
- Jarvinen J., Taiminen H.** 2016. Harnessing marketing automation for B2B content marketing. *Industrial Marketing Management*. URL: https://www.researchgate.net/publication/280875581_Harnessing_marketing_automation_for_B2B_content_marketing (accessed: 19.01.2023).
- Montgomery A., Srinivasan K.** 2003. Learning about customers without asking. The power of one—Leverage value from personalization technologies, 122–143.
- Гринько О.** 2019. Воронка контент-маркетинга. *Наука и инновации*, 9, 53–57.
- Котик В. К.** 2020. Использование программного обеспечения AnyLogic в имитационном моделировании. *Молодой ученый*, 51 (341), 13-15.
- Чепорова Г. Е., Цурко О. Ю.** 2019. Внедрение интернет-маркетинга в современный бизнес. Актуальные проблемы и перспективы развития экономики, 272-273. Имитационное моделирование. URL: <https://www.anylogic.ru/use-of-simulation> (дата обращения: 19.01.2023).

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