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A SIMULATION MODEL OF THE RETAILER'S RESPONSE TO NEGATIVE ONLINE BUYER'S REVIEWS AND COMMENTS

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Natorina A. O. A Simulation Model of the Retailer's Response to Negative Online Buyer's Reviews and Comments

The article substantiates that in the conditions of digitalization of the Ukrainian economy, the decision of the online buyer to choose and purchase goods is influenced by reviews/comments on the Internet. It is determined that the successful online activity of the retailer, including a positive image and the desired level of sales, is provided by her/his ability and skills to correctly respond to the reviews/comments of the online buyer. On the basis of the systematized literature sources and a comparative analysis of the results of empirical researches of well-known leading scholars and economists at the national and international levels, the author presents the typology of reviews/comments of the online buyer, which defines the specifics of the retailer's response. The need and importance of developing alternative patterns of timely response of retailers to reviews/comments of the online buyer in ever-changing realities is proved with arguments. Appropriate recommendations to the retailer regarding an adequate response to the reviews/comments of the online buyer are suggested according to the typology, their differences are interpreted. A simulation model of the retailer's response to negative reviews/comments of the online buyer with desensitization of the target audience according to the context of the current situation has been developed. In the development of this simulation model, using the «BP Simulator» software to simulate business processes, a relevant low-abstraction approach was applied, taking into account management features at all strategic levels, and providing for the possibility of modifying the model based on the scale and metrics of the retailer's practical activities. The results of the practical approval of the developed simulation model show the feasibility of its implementation by retailers of different market segments to improve the efficiency of online activities.

Keywords: *digitalization, review and comment of online buyer, retailer, simulation model.*
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Наторіна А. О. Імітаційна модель реагування ритейлера на негативні відгуки / коментарі онлайн-покупця

У статті обґрунтовано, що в умовах діджиталізації української економіки на прийняття рішення онлайн-покупця щодо вибору та покупки товару впливають відгуки/коментарі в Інтернеті. Детерміновано, що успішна онлайн-діяльність ритейлера, у тому числі позитивний імідж і бажаний рівень продажів, забезпечується його здатністю й уміннями коректно реагувати на відгуки/коментарі онлайн-покупця. На базі систе-

матизації літературних джерел і компаративного аналізу результатів емпіричних досліджень відомих провідних учених і економістів на національному та міжнародному рівнях презентовано типологію відгуків/коментарів онлайн-покупця, що визначає специфіку реагування ритейлера. Аргументовано доведено необхідність і важливість розробки альтернативних патернів своєчасного реагування ритейлера на відгуки/коментарі онлайн-покупця в постійно мінливих реаліях. Надано відповідні рекомендації ритейлеру щодо адекватного реагування на відгуки/коментарі онлайн-покупця згідно з типологією, інтерпретовано їх відмінності. Розроблено імітаційну модель реагування ритейлера на негативні відгуки/коментарі онлайн-покупця з десенсибілізацією цільової аудиторії відповідно до контексту поточної ситуації. При розробці цієї імітаційної моделі за допомогою програмного забезпечення для моделювання бізнес-процесів «BP Simulator» використано релевантний підхід з низьким рівнем абстракції, що враховує особливості менеджменту на всіх стратегічних рівнях, а також передбачає можливість модифікації моделі згідно з масштабами та метриками практичної діяльності ритейлера. Результати апробації розробленої імітаційної моделі свідчать про доцільність її імплементації ритейлерами різних ринкових сегментів для підвищення ефективності онлайн-діяльності.
Ключові слова: *діджиталізація, відгук і коментар онлайн-покупця, ритейлер, імітаційна модель.*
Рис.: *3.* ***Табл.:*** *2.* ***Бібл.:*** *14.*

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Наторина А. А. Имитационная модель реагирования ритейлера на негативные отзывы/комментарии онлайн-покупателя

В статье обосновано, что в условиях диджитализации украинской экономики на принятия решение онлайн-покупателя относительно выбора и покупки товара влияют отзывы/комментарии в Интернете. Детерминировано, что успешная онлайн-деятельность ритейлера, в том числе положительный имидж и желаемый уровень продаж, обеспечивается его способностью и умениями корректно реагировать на отзывы/комментарии онлайн-покупателя. На базе систематизации литературных источников и компаративного анализа результатов эмпирических исследований известных ведущих ученых и экономистов на национальном и международном уровнях презентована типология отзывов/комментариев онлайн-покупателя, что определяет специфику реагирования ритейлера. Аргументировано доказана необходимость и важность разработки альтернативных паттернов своевременного реагирования ритейлеров на отзывы/комментарии онлайн-покупателя в постоянно меняющихся реалиях. Даны соответствующие рекомендации ритейлеру относительно адекватного реагирования на отзывы/комментарии онлайн-покупателя согласно типологии, интерпретированы их отличия. Разработана имитационная модель реагирования ритейлера на негативные отзывы/комментарии онлайн-покупателя с десенсибилизацией целевой аудитории согласно контексту текущей ситуации. При разработке этой имитационной модели с помощью программного обеспечения для моделирования бизнес-процессов «BP Simulator» использован релевантный подход с низким уровнем абстракции, что учитывает особенности менеджмента на всех стратегических уровнях, а также предусматривает возможность модификации модели исходя из масштабов и метрик практической деятельности ритейлера. Результаты апробации разработанной имитационной модели свидетельствуют о целесообразности её имплементации ритейлерами разных рыночных сегментов для повышения эффективности онлайн-деятельности.
Ключевые слова: *диджитализация, отзыв и комментарий онлайн-покупателя, ритейлер, имитационная модель.*
Рис.: *3.* ***Табл.:*** *2.* ***Библ.:*** *14.*

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In the realities of digitalization of the Ukrainian economy, the specifics of the retailer's activities on the Internet are radically changing. Digital transformations lead to rethinking the retailer's vision and improvement of its business processes, primarily targeted at creating a positive experience of online buyers. Online buyers' experience gained as a result of interacting with the retailer is reflected in comments / reviews on the Internet, can positively and negatively affects the retailer's reputation and image. According to the above, the urgent task for retailers today is the ability to work with online buyers and correctly respond to their reviews / comments, including negative ones.

Ukrainian and foreign scientists and economists in their works [7–9] note the importance of the implementation and development of innovative, information and communication technologies for offline and online enterprises' activities. Moreover, the scientists and economists [1–5; 11–12] in their publications are focused on the importance of the correct interaction between retailers and buyers for the implementation of effective activities online.

At the same time, after a detailed analysis of study [4], the key features of interactive communication between buyers and sellers in social networks are identified. Moreover, the reasons and consequences of the publication of online buyer's reviews / comments for sellers are revealed. Particularly noteworthy is study [5], where authors present the role and impact of online buyer's reviews / comments on the seller's credibility. This emphasizes the importance of reviews / comments for both – online buyers and online sellers. Work [6] also describes in detail the impact of buyers' reviews on the target audiences' decision to make various online purchases. This once again confirms the importance of the retailer's rational work with online buyers' reviews / comments.

Despite the large number of publications on this topic, it should be noted that the problems of interaction between retailers and online buyers as well as the specifics of the retailers' response to negative online buyer's reviews / comments on the Internet are fragmentarily studied. Based on the foregoing, the *purpose* of the study is to develop a simulation model of the retailer response to a negative review / comment of online buyers with desensitization of the target audience to the situation that arose.

According to the global study of online buyers' behavior [1], it is determined that in 2019 a significant part of Ukrainian online buyers used the Google search to find the necessary information about a product and / or service before buying them (77%); investigate new products / brands (73%) (72% accounting for new products); search comments and reviews from other buyers (68%). At the same time, the majority of Ukrainian respondents noted that all of the information received using Google prompted them to make an online purchase, including by means of a smartphone (66%). Video reviews and comments analysis were decisive factors for them before buying a certain product [1–3]. In addition, according to the results of researches [2], 70% of online buyers regularly checked reviews before doing online purchases in 2019. The statistical analysis of Google's search queries related to the name of retailers showed that the ratio of interest in reviews / comments about them and transactional requests indicates different results. Based on this, it can be affirmed that online buyers' reviews and comments impact the purchase decision and, as a consequence, the retailer's image and sales.

Therefore, it is very important to investigate the typology of online buyers' comments / reviews on the Internet and justify the relevant retailers' activities in order to mitigate possible negative consequences and maximize benefits in the future. It is identified that there are three types of online buyers' reviews / comments on the Internet (*Fig. 1*).

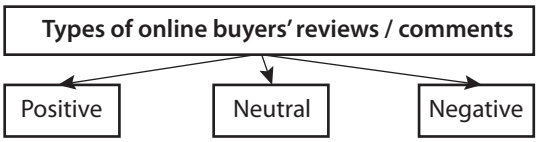

Fig. 1. Types of online buyer's review / comment on the Internet

Source: developed by the author based on [7–12].

The typology of reviews / comments determines the specificity of the retailer's response to them. If online buyers post a positive review / comment after their purchase, the retailer should thank them for the attention they paid and the time they spent on publishing this review / comment. Moreover, the retailer's response should not be the stock one. In addition to the post with thanks to the online buyer, it is recommended for the retailer to positively evaluate the review / comment.

The retailer needs to strive to increase the number of positive reviews / comments on their online platforms. For this purpose, they are proposed: (a) to configure automatic dispatch of a trigger message to the buyer after making an online purchase with a request to post a review / comment; (b) to encourage online buyers for the published review / comment by providing a certain discount on the subsequent online order or by crediting bonuses to the personal account of the online buyer's card.

If an online buyer thanks a particular employee in his / her review / comment, the retailer should join in the praise. This will contribute to the formation of the retailer's positive image and will strengthen its position among competitors. Increasing the number of positive reviews / comments is an effective way to reduce the weight of negative ones.

The neutral review / comment is posted by an online buyer for the purpose of self-expression. Such review / comment does not significantly affect the retailer's activities. The retailer is recommended to thank the online buyer for the review / comment and write about the constantly updated product range of its online store and the possibility to choose more goods, which could also be useful for him / her.

In most cases, negative online buyers' reviews / comments represent problematic aspects of the retailer's activity. The retailer has an opportunity to improve its own business processes by a correct, quick and timely response to such online buyers' reviews / comment. The retailer's solving online buyers' problem attracts a lot of attention of the target audience. Therefore, the degree of desensitization of the target audience to the situation that arose as well as the prospects for further cooperation of the online buyer with this retailer depend on how quickly the retailer can solve the online buyer's problem and settle all his / her claims.

It should be noted that nowadays, in Ukraine and in the world, there is no unified model for the retailer's response to online buyers' negative reviews / comments. This emphasizes the relevance and significance of the study. Therefore, it is recommended to consider retailers' activity with negative reviews / comments of online buyers in three consecutive stages: (1) systematic tracking of online buyers' reviews / comments on the Internet (website, social networks) in order to find negative ones; (2) formation and adoption of the optimal solution of the problem for the online buyer and the retailer; mitigating the negative consequences of the problem caused by the publication of the negative review / comment; (3) implementation of relevant actions to solve the online buyer's problem.

The simulation model of the retailer response to an online buyer's negative review / comment with desensitization of the target audience to the situation that arose was developed by using free software for business

process modeling "BP Simulator" [13]. Furthermore, to develop the simulation model, an approach characterized by a low level of abstraction and taking into account all features and details at the operational level was used.

The developed model was a simulator for conducting experiments and made it possible to examine in detail, determine and analyze all cause-effect relationships between its objects and phenomena. This model demonstrates the degree of the objects and phenomena influence on the duration of the retailer's activity. It provides for the identification of objects parameters of the optimal model to implement the effective retailer's activities on the Internet.

The main elements that were used for the model development as well as their values are presented in *Tbl. 1*.

Table 1

Elements of the simulation model

No.	Element	Set of values
1	Resource	$TG = \{TG_1, TG_2, TG_3\}$
2	Fuction 0 0 0 0	$F = \{F_l\}$, where $1 \le l \le 13,\ l \in Z$
3	Executor	$Ex = \{Ex_1, Ex_2\}$
4	Resource	$Rs = \{Rs_1, Rs_2\}$
5	Check Point 00:00:00 $0.00	$CP = \{CP_1, CP_2, CP_3\}$

Source: developed by the author.

According to Tbl. 1, the total number of Task Generators that were used in the simulation model is 3, specifically: TG_1 – search for an online buyer's negative review / comment; TG_2 – making a decision to solve the online buyer's problem; TG_3 – implementation of relevant actions to solve the online buyer's problem. It should be noted that the Task Generators in the simulation model correspond to three consecutive stages of the retailers' activity with an online buyer's negative review / comment, which were described above. This made it possible to more accurately identify all the necessary time intervals and adjust other properties of the model elements, which, in general, positively affected the accuracy of the results obtained during the simulation.

The simulation model includes 13 Objective Functions: F_1 – monitoring and identification of a negative review / comment by an online buyer; F_2 – clarification of the reasons for the online buyer's negative review / comment; F_3 – verification of the online buyer's data; F_4 – identification of aspects of the online buyer's problem; F_5 – formation of alternative solutions to the problem; F_6 – selection of the optimal solution to the problem and agree it with the online buyer; F_7 – publication of the response to the online buyer and explanations for the target audience; F_8 – removal of the online buyer's negative review / comment within 7 days; F_9 – the problem's solution; F_{10} – informing the online buyer about the problem's solution; F_{11} – sending a direct message to the online buyer with the request to publish a review / comment about the problem's solution; F_{12} – publication of the problem's solution summary; F_{13} – publication of the problem's solution report with necessary explanations for the target audience.

There are two Executers involved in the processes of searching for an immediate solution to the problem of the online buyer who posted a negative review / comment on the Internet and communication with him / her. They are Manager (Ex_1) and Customer Service Department (Ex_2). These Executers are responsible for the implementation of Functions in the simulation model.

The Resources required to complete Functions are indicated in the model as Rx_1 – software and Rx_2 – set of alternative solutions.

Also, in the developed simulation model, 3 Check Points (CP_1, CP_2, CP_3) were used as additional elements designed to monitor the progress of business processes and control the tasks flow.

It is important to note that each element of the simulation model has a certain set of optimal properties that were configured taking into account the specifics of the retailer's activity on the Internet and justified as a result of iterations. The list of the properties of the model elements in the "BP Simulator" [12] includes Duration, Global priority, Joint fulfillment, Local priority, Name, Number of employees, Operating periods, Probability distribution of tasks, Rule distribution of tasks, Tasks count, Time of delivery a task. The Event-driven Process Chain (EPC) elements of the simulation model and their values are presented in *Tbl. 2*.

Table 2

EPC elements of the simulation model

No.	Element	Set of values
1	Event	$Ev = \{Ev_m\}$, where $1 \le m \le 9,\ m \in Z$
2	Regulator	$Rg = \{Rg_1, Rg_2, Rg_3, Rg_4\}$
3	Input / Output	$IO = \{IO_1, IO_2, IO_3\}$
4	Comment	$C = \{C_1, C_2, C_3, C_4\}$

Source: developed by the author.

According to Tbl. 2, in the simulation model, Events (*Ev*) display reasons or results of the implementation of Functions, where Ev_1 – publication of a negative review / comment by an online buyer; Ev_2 – data is verified; Ev_3 – data is not verified; Ev_4 – the problem's solution is agreed

with the online buyer; Ev_5 – the online buyer refused to solve the problem; Ev_6 – the online buyer positively perceived the problem's solution; Ev_7 – the online buyer dissatisfied with the problem's solution; Ev_8 – the online buyer published a positive review / comment; Ev_9 – the online buyer refused to post a positive review / comment.

There are 4 Regulators in the developed model: Rg_1 – guidelines for the rational interaction with online buyers; Rg_2 – guidelines for the correct and effective work with online buyers; Rg_3 – agile management directives; Rg_4 – guide of the relevant content creation. Moreover, the implementation of certain Functions in the model involves the same Regulators (Rg_2, Rg_4).

Input / Output (*IO*) is an EPC element of the simulation model. Its values are: IO_1 – set of the solutions; IO_2 – the best problem's solution for the online buyer and retailer; IO_3 – results of the problem's solution. The use of this element in the simulation model reflects the information basis for the implementation of Function or presents the result of its implementation.

Comments (*C*) are also EPC elements of the simulation model, among which there are: C_1 – the person who published the negative review / comment is not a real online buyer; C_2 – the online buyer's unwillingness to solve the problem; C_3 – publishing / sending direct messages to the online buyer; C_4 – the online buyer is dissatisfied with the problem's solution, although he / she previously chose the best alternative solution for him / herself. The use of Comments in the developed model is due to the need to display explanations to certain Functions.

Fig. 2 shows the fragment of the developed simulation model of the retailer's response to an online buyer's negative reviews / comments with desensitization of the target audience.

According to Fig. 2, the simulation model logically and consistently displays the retailer's steps and business processes that are directly related to responding to an online buyer's negative reviews / comments. The conditions that were determined for the simulation are: (1) working hours for Manager and Customer Service Department – 8 hours, from Monday to Friday; (2) the duration of the simulation – 21 days (working days of November, 2019).

As a result, according to the model, during 21 working days, 102 tasks were created, 100 of which being fully completed. Partial completion of tasks is determined by the time frame during which Executers have to solve online buyers' problems in the most preferred way for the buyers. The percentage of the tasks completion and expectations of their completion is 42% / 58%. *Fig. 3* presents the created and completed tasks (a) as well as the length of the queue (b) with the bottlenecks of performing tasks.

An important feature of the developed model is the maximum productivity of Executers (with the performance of 100 %). Tact time is 54:00. Cycle time is 04:52:38. This confirms the effectiveness of the developed model.

CONCLUSIONS

The developed simulation model of the retailer's response to an online buyer's negative review / comment with desensitization of the target audience was successfully tested by one of the Ukrainian retailers in the drogerie segment, which were previously studied in [14]. The implementation of this model allowed the retailer to reduce Cycle time by approximately two times. The model also helped timely identify online buyers' problems, quickly solve them and then get positive reviews / comments from these buyers about the positive problem solving. Thus, the developed simulation model of the retailer's response to an online buyer's negative review / comment is recommended to use for retailers in different segments to increase the effectiveness of their activities on the Internet. It should be emphasized that the developed model can be modified by retailers based on the specifics of their practical activities. ■

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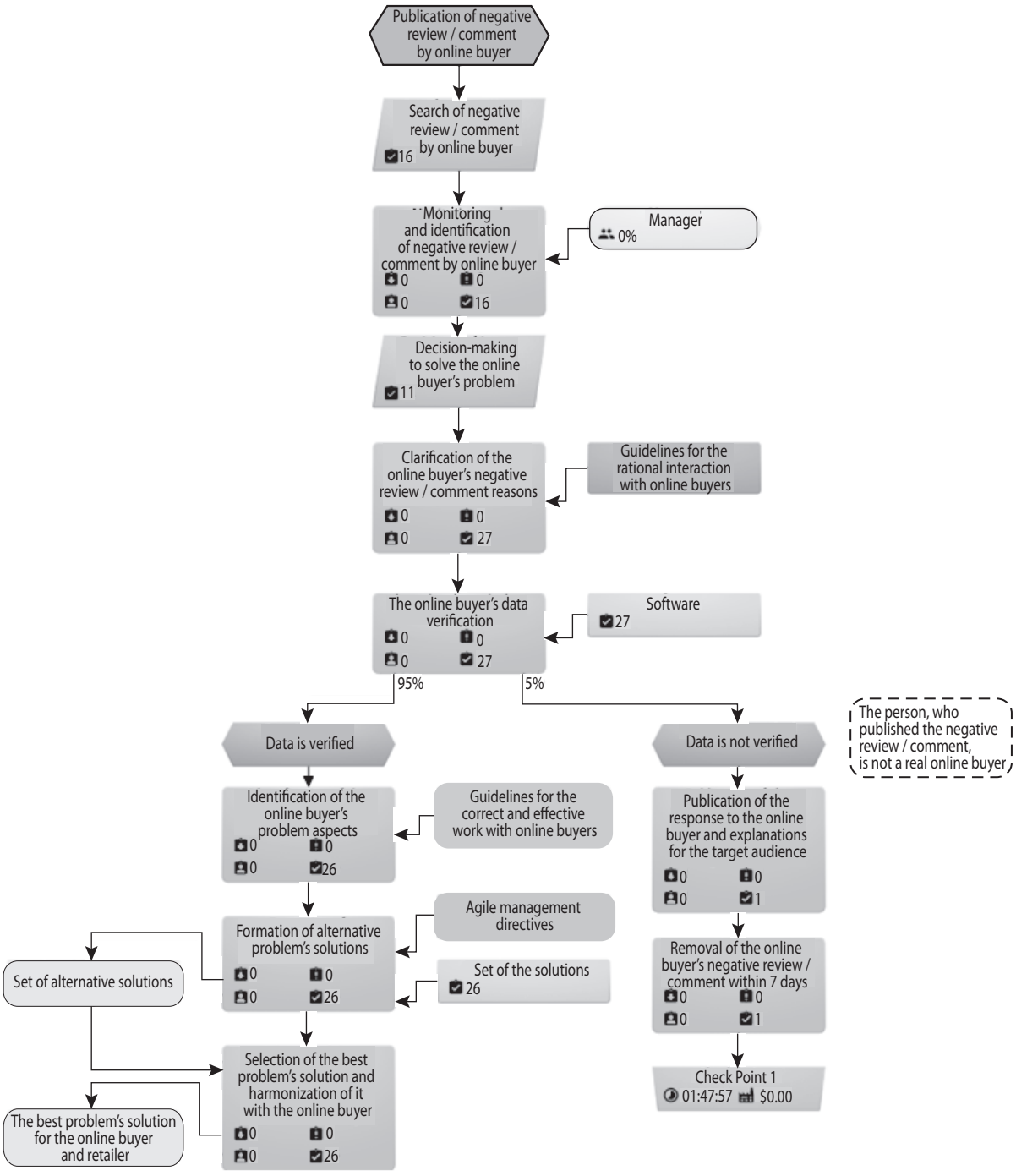

Fig. 2. Fragment of the simulation model of the retailer's response to negative reviews / comments of online buyers

Source: developed by the author.

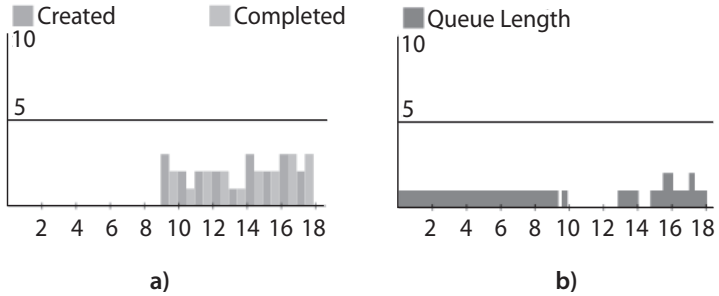

Fig. 3. Created and completed tasks (a) with the queue length (b) in the simulation model

Source: developed by the author.

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