

UDC 330:005.94:004

JEL classification: M39

DOI: <https://doi.org/10.20535/2307-5651.18.2021.238105>**Nataliya Yudina**PhD, Associated Professor
ORCID ID: 0000-0002-1730-9341**Olena Pidlisna**PhD, Associated Professor
ORCID ID: 0000-0003-2814-368XNational Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute"

MARKETING PERCEPTION OF TECHNOLOGICAL UNCERTAINTY BY DECISION-MAKERS

МАРКЕТИНГОВЕ СПРИЙНЯТТЯ ТЕХНОЛОГІЧНОЇ НЕВИЗНАЧЕНОСТІ ОСОБАМИ, ЩО ПРИЙМАЮТЬ РІШЕННЯ

The contemporary stage of marketing development assumes the decision making under the conditions of great uncertainty. This uncertainty brings many innovative global risks which are defined by the technological features of Industry 4.0. In the article it was highlighted the importance of the investigation of the perception level of marketers, economists, managers and other decision-makers of the existed technological uncertainty through the examples of its elementary components (gadgets and marketing communications) under the rapidly changing technological conditions of Industry 4.0 because their decisions would have the long-term effects and the high impact to the society. It was demonstrated that a gadget been a smart system turned into the example of one of the most impact global technological risks and an additional element of most communications chains of a human and it could impact to the human's perception of most information and define some human's cognitive deformations for the prediction of the future. There are results of the international marketing research conducted by the article authors during the Summer School, been collective organized by the Faculty of Management and Marketing of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine) with the cooperation of the Faculty of Engineering Management of Poznan University of Technology (Poland). It makes it possible to understand how respondents perceive different marketing and technological changes in the economy 4.0 that reflects Industry 4.0 The marketing research results shown that the today's perception of advertising of the international respondents which were represented by the future decision-makers of companies, still corresponds with the tradition model of the marketing communication process that has grounded on the basis of the mathematical theory of communication by C. E. Shannon and W. Weaver. In the article it was highlighted that this model needed to be updated under the conditions of Industry 4.0. The improved model of the digital system of advertising activity management and communications was proposed by the authors of the article. Two new elements an internet user's gadget and the ISPs software were added into the scheme. This simplifies understanding of the process of advertising targeting, advertising decoding and other digital communications. The research results also demonstrated how decision-makers perceived the scale and dangerous of technological changes. It was proposed to the decision-makers to implement logarithmic thinking on the basis of the inferior scope of processing information for making prompt and effective decisions at the companies.

Keywords: marketing perception, global risks, uncertainty, logarithmic thinking, linear thinking.

Поточний етап розвитку маркетингу передбачає прийняття рішень в умовах значної невизначеності. Ця невизначеність призводить до появи багатьох інноваційних глобальних ризиків, які визначаються технологічними особливостями Індустрії 4.0. У статті була підкреслена важливість вивчення рівня сприйняття існуючої технологічної невизначеності на прикладах її елементарних складових (гаджетів та маркетингових комунікацій) у стрімко змінних технологічних умовах Індустрії 4.0, оскільки їх управлінські рішення мають довгострокові ефекти та значний вплив на суспільство. Було продемонстровано, що гаджет, являючись старт-системою, перетворюється у приклад одного з найбільш впливових глобальних технологічних ризиків та додатковим елементом більшості комунікаційних ланцюгів людини, і тому він може здійснювати вплив на сприйняття людиною більшості інформації та визначати деякі когнітивні викривлення у процесах передбачення майбутнього. У статті були представлені результати міжнародного маркетингового дослідження, проведеного авторами статті під час Літньої Школи, сумісно організованої факультетом менеджменту та маркетингу Національного технічного університету України «Київський політехнічний інститут імені Ігоря Сікорського» (Україна) у співпраці з факультетом інжинірингу управління у Познанському університеті технологій (Республіка Польща). Це відкрило можливість зрозуміти, яким чином респонденти сприймають різноманітні маркетингові та технологічні зміни в умовах економіки 4.0, що відображає особливості Індустрії 4.0. Результати маркетингового дослідження показали, що сприйняття реклами міжнародними респондентами, що були представлені майбутніми особами, що прийматимуть управлінські рішення, досі відповідає традиційній моделі процесу маркетингових комунікацій, що ґрунтується на математичній теорії комунікації К.Е. Шеннона та У. Уівера. У статті було підкреслено, що ця модель потребувала оновлення для умов Індустрії 4.0. Авторами статті була запропонована удосконалена модель управління цифровою системою рекламної діяльності та комунікацій. У традиційну схему було додано два нових елементи – гаджет інтернет-користувача та програмне забезпечення ISPs. Це спрощує розуміння процесів рекламного таргетингу, декодування рекламних по-

відомлень та інших діджитал-комунікацій. Результати дослідження також продемонстрували, яким чином особи, що приймають рішення, сприймають масштаб та небезпеку технологічних змін. Було запропоновано особам, що приймають рішення, впроваджувати логарифмічне мислення на основі незначного обсягу інформації для прийняття оперативних та водночас ефективних рішень в компаніях.

Ключові слова: маркетингове сприйняття, глобальні ризики, невизначеність, логарифмічне мислення, лінійне мислення.

Introduction. The contemporary stage of marketing development assumes making management decisions under the conditions of great uncertainty (Yudina, 2020). This uncertainty brings many innovative global risks including different technological features of Industry 4.0 (Schwab, 2017), the economy 4.0 and a new type of the economic relations marketers will have to face with. This year technological risks and trends are supposed to stay a decade at least (ISI Emerging Markets Group, 2020). But do the marketers, economists, managers and other decision-makers perceive this technological uncertainty equally correct?

There are many authors who have investigated marketing perception like Heavy C., Simsek Z., Scranton Ph., Sample K.L., Hagtvedt H., Brasel S.A., Havidz H.B., Mahaputra M.R., Marino V., Resciniti R., D'Arco M., Chan C.S., Nozu K., Cheung T. and many others. But most of them have investigated the consumer's perception of different marketing aspects like price, branding, advertising and other parts of promotion and communications, quality of goods, delivery and so on or the results need updating. But under the conditions of global uncertainty it is more important for us to investigate perception of creators of these marketing aspects. Each of them will develop and approve of different future marketing strategies of their companies. And if they are not equally mindful of the future changes, marketing strategies may harm to the society in the future.

Task setting. The purpose of the article is to find out the perception level of uncertainty by marketers, economists, managers and other decision-makers under the rapidly changing technological conditions of Industry 4.0.

Methodology. The methods of the system analysis, the analyses of the global marketing environment, the interview, the quiz, the methods of the analogies are used in the article.

Research results. In accordance with different Foresights 2021, the most influenced technological trends are the next: the IT's pandemic response; the growing influence of IT, amplification of IT issues, accelerating of previous IT trends (Lux Research, 2021; NTT Data, 2021). Among them there are also the growth of a seamless world, the transformative power of Artificial Intelligence, the growth of consolidated data, individual-centered design, the complication of IT infrastructure, IT-based simulation; the implementation of different new norms, software-driven evolution, accelerated automation (NTT Data, 2021). But every of such kind technological trends is highlighted by the consequences of the pandemic of the coronavirus disease (COVID-19) that has lead to humans insularity, maladjustment and their connection by their gadgets.

Most contemporary gadgets are the smart systems. A smart system assumes specific, measurable, assignable, realistic and time-related functions of the technology of making decisions on the basis of analyzing a situation by sensing, actuation and control (Doran, 1981). So gadgets,

been a smart-system, have already turned into an additional element of most communications chains of a human and they can impact to the human's perception at least. When a human perceives information for prediction the future, some cognitive deformations influence on the perception (Turchin, Batin, 2013). There are many different external and internal factors which define this cognitive deformation. Among them there is a dependence of a human perception on available information and the previously reads. In most cases the gadgets are those kinds of previous reads today. So they are able to define the process of making decisions. But we can watch the warring signs that decision-makers don't realize the consequences of neglection of the rapid technological leap if technologies outgrow humankind in the future.

This fact was show and investigated by the international interactive marketing research that had been conducted by us during the Summer School, been collective organized and conducted by the Faculty of Management and Marketing of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine) with the cooperation of the Faculty of Engineering Management of Poznan University of Technology (Poland). There were 23 representatives from Ukraine, Poland, Iran, China and Ghana taken part in our marketing research. Initially there was a discussion about the features of marketing, communications, economic relations and the economy 4.0 under the conditions of Industry 4.0. And than three questions through the examples of elementary components of technological uncertainty were asked the participants of the Summer School which had to help us to understand how respondents perceived different marketing changes in the economy 4.0.

The answers to the question "Who responds to ads?" show that most respondents (70%) continue perceive that a human responds to ads (Fig. 1).

The today's perception of advertising still corresponds with the previous tradition model of the marketing communication process that has grounded on the basis of the mathematical theory of communication by C.E. Shannon and W. Weaver (Fig. 2) (Shannon, Weaver, 1949).

This model states that the communication process assumes building of communication relations and then economic relations between a management system (an advertiser) and a receiver (a target audience) through a traditional communication channel (TV, radio, newspapers and so on). Depending on the type of the market (B2C or B2B) different members of a buying center, consumers or consumers' influencers play the role of the communication receiver. But the receiver has been always a human. According to this model efforts of the advertising message coding are being made on the advertiser's side by the advertiser or an advertising agency. And efforts of the advertising message decoding are being made on the receiver's side (by the receiver's brain perception of the advertising message). Considering the fact that this model was developed under the conditions when industrial society

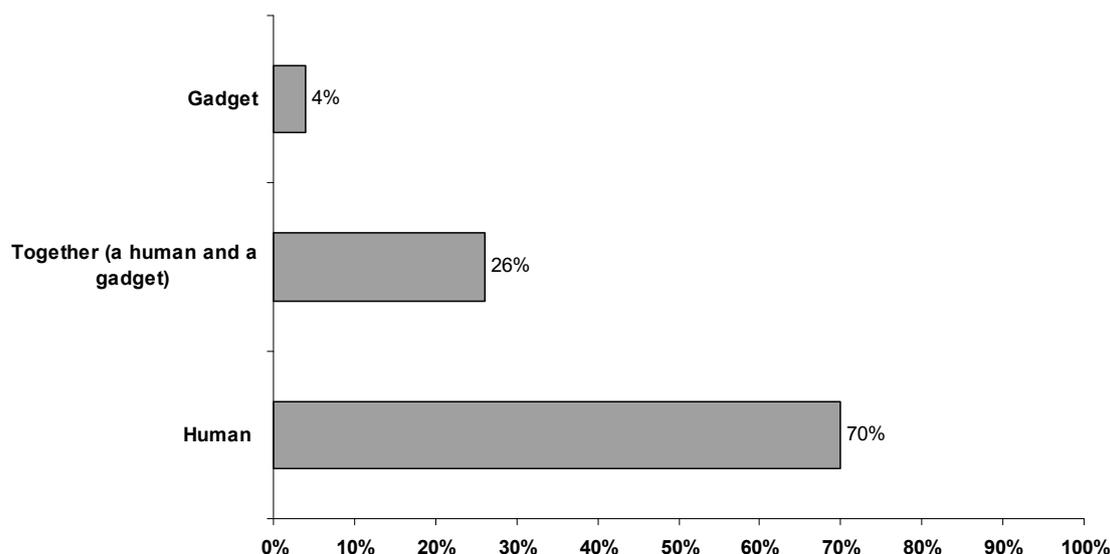


Figure 1 – The answers to the question “Who responds to ads?”

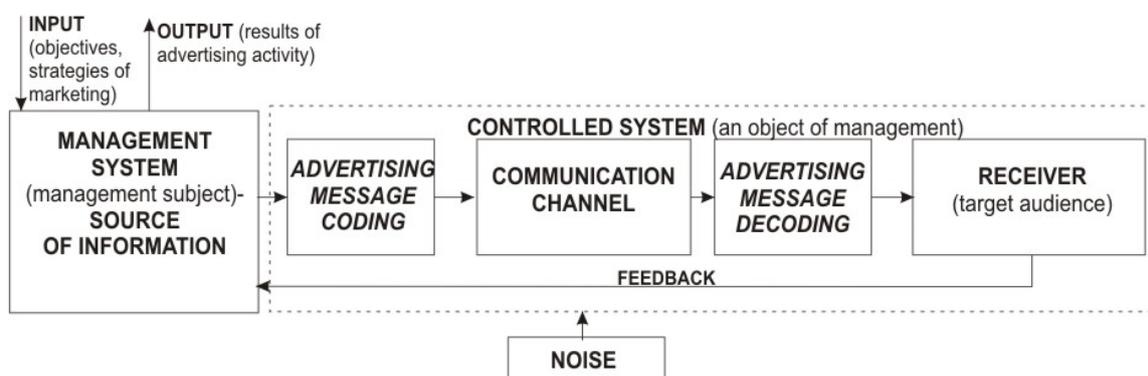


Figure 2 – The traditional system of management of the enterprise advertising activity (Shannon, Weaver, 1949)

predominated over the information society, the gadget was perceived and typified of as a part of a communication channel.

But in information society this model of the marketing communication process has already become antiquated. Although research results show that most humans don't perceive this fact yet. We can see on Fig. 1 that in information society respondents don't still perceive technologies as the effective marketing tools for managing our brain to make decisions. Just 26% of respondents answered that a human and a gadget together responded to ads. And only 4% of the interviewed respondents perceived a gadget as a target audience of ads. The previous marketing communication model been effective in the industrial society has already changed under the conditions of the information society, new elements (including a gadget) appeared in it and were added in this communication process (Fig. 3).

It has been proposed to add two new blocks in the scheme of advertising activity management on internet. There are ISPs software and a gadget. Some digital companies have already started to install some special software in the ISPs (ISP means the Internet Service Provider) networks (Yudina, 2020). They implement the “behavioural” approach to targeting internet advertising this way. This installed software makes it possible to intercept all user's internet requests to create a profile of his

or her internet interests. The internet interest profile creates a possibility to target advertisements more effective. This approach is widely used in social media, different portals, web-sites and so on. After some previous internet request, the internet user will be facing on these sites with particular advertisements which correspond with the previous internet request by the user on different other sites and provoke a potential consumer to purchase some advertising goods during very long time.

ISPs software receives this kind of information from the user's gadget. The gadget accumulates the big data of behavior of a human and shares this information with the software of internet providers or doesn't do this. But if the user's gadget turns on the ‘incognito’ regime, the ISPs Software may face with a problem of watching, accumulating the user's internet activity and targeting of advertising. That is why the user's gadget has been added as a new element of the digital system of advertising activity management.

On internet communication channel the process of advertising message decoding happens twice. On the one hand the advertising message is decoded by the technology of advertising targeting by ISPs Software. And on the other hand then the advertising message is targeted and led to a target audience representative's gadget to be decoded and perceived by a human's brain if the user's gadget doesn't

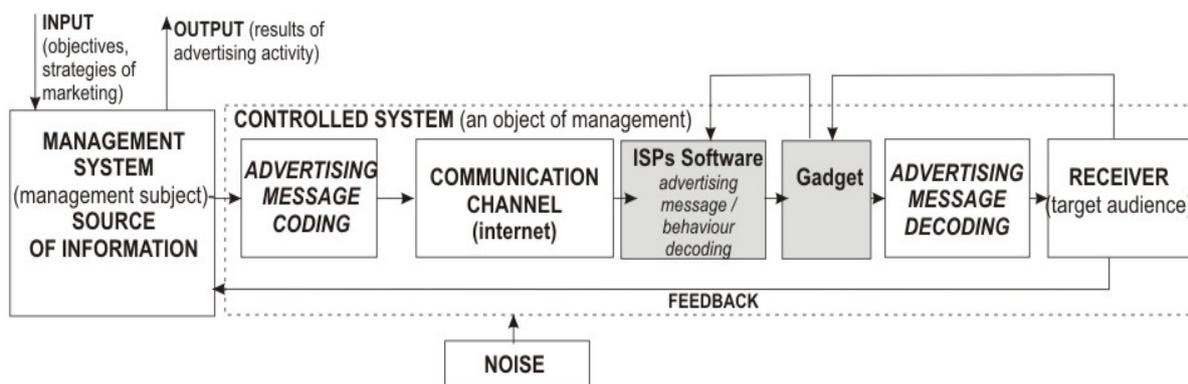


Figure 3 – The digital system of advertising activity management

Source: improved by the authors

use the special applications which block all internet advertisements.

Our research also demonstrated that the respondents well realized that marketing tools would change under the economic conditions of information society and economy 4.0. On the question “Will marketing tools change in Economy 4.0?” we received the next answers by the emojis (Fig. 4).

So we can conclude that most respondents has already realized the high possibility of the marketing changes but haven’t perceived a course of these changes yet. For example, we received the next answers to the question “Is the news an advertisement?” (Fig. 5).

As we can see most respondents (85%) have perceived that the news could turn into advertising. These results can be explained by the existence of their previous professional experience when news information has been presented for promotional purposes.

On the one hand different authors supposed that a human brain thinks by the linear way (De Langhe, Puntoni, Larrick, 2017; Kordejro, 2020). This approach assumes that the relationship between a human’s perception of different facts (for example, the relationship between evidence and its consequences) is linear (De Langhe, Puntoni, Larrick, 2017). It was supposed a human’s brain to develop simultaneously with a technological development. Every new step of the technological leap had been perceived normally by humankind until the

technological development started to outgrow the human brain development. It’s too difficult for an ordinary human to perceive and adapt to the rapid technological changes that leads to different future shocks (Toffler, 1970). There is also a fact that humans are able to think quicker and remember much more information than 109–1025. The neurophysiologists’ researches showed that the information volume which can fit into the brain is near by the petabytes (Thomas, Bartol, Bromer, Kinney, Chirillo, Bourne, Harris, Sejnowski, 2015), but humans don’t try to remember all information of the internet and operate much more internal information resources than it has been supposed to be used by humankind before.

The other approach to this issue has appeared recently and now there is a new hypothesis that innately a human’s brain is operating according to the logarithmic way when there is no previous special robust educational experience (Varshney, Dum, 2013). This assumes that in these cases, information, particularly numbers, is perceived logarithmically by a human according to the empirical Weber-Fechner Law (Fig. 6):

$$P = K \cdot \log \frac{S}{S_0}, \tag{1}$$

S_0 – a minimal threshold of perception, S – changed stimulus intensity, P – perceived intensity, K – a constant ratio (Liberal Dictionary, 2021).

This perception creates much more sensitive responsible reactions to a fewer stimulus because the

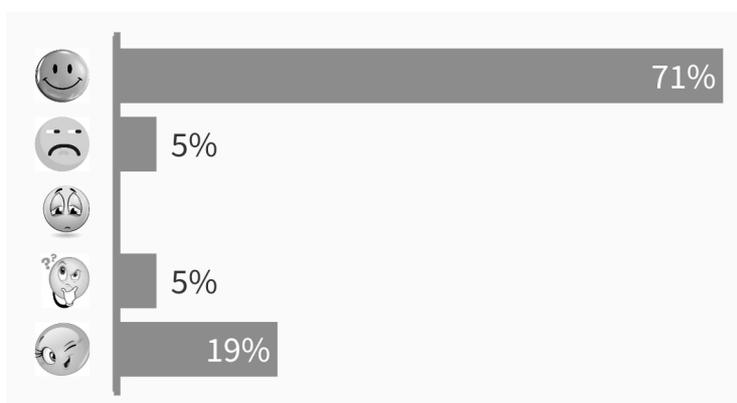


Figure 4 – The answers to the question “Will marketing tools change in Economy 4.0?”

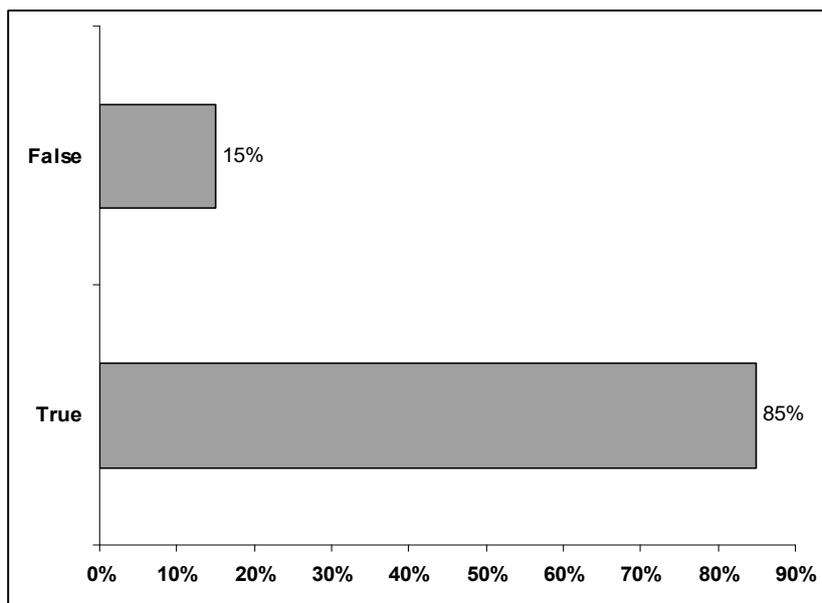


Figure 5 – The answers to the question “Is the news an advertisement?”

human brain noticed relative changes of stimulus intensity. So we are able to make correct decisions on the basis of the Little Data more effective than on the basis of the Big Data. Such kind of perception gives humankind an ‘evolutionary advantage’ to estimate critical information correctly and free from error on the basis of fewer statistics (De Langhe, Puntoni, Larrick, 2017). But it also creates a perception threshold when the different stimulus intensities of the Big Data perceive with no difference between them. For example, it has to be considered that the main feature of the virus responsible for the Sars-Cov-19 is its exponential rush development as in the world as in a human organism. And a practice has shown that humankind couldn’t keep pace with this development. It has not been enough time for an ordinary human to realize how quickly this disease developed from its beginning to its critical stage when a human was not already able to breathe for being saved. So it can be assumed that our previous educational experience of the flue epidemics has spoiled a collective perception of the coronavirus pandemic that would be more sensitive by the natural way of perception.

So we have to conclude that under the conditions of uncertainty it is more effective to make decisions on the basis of logarithmic thinking and the inferior scope of processing information rather than linear thinking on the basis of previous educational experience. This means that the decision-makers (marketers, managers, economists) have to analyze all global and local future risks and their dynamics very deeply and accurately and predict all their possible negative consequences. It will help the decision-makers to operate instantaneously under the condition of Industry 4.0 when the technologies have already overtaken a human in development.

Conclusions. The contemporary stage of marketing decisions corresponds with uncertainty of the future. This uncertainty brings many innovative global risks including technological features of Industry 4.0. So it was important for us to investigate the perception level of uncertainty by marketers, economists, managers and other

decision-makers under the rapidly changing technological conditions of Industry 4.0 because their decisions have a long-term effect and high impact to the society.

The digital system of advertising activity management and communications was proposed. Two new elements an internet user’s gadget and ISPs software were added into the scheme. This simplifies understanding of the process of advertising targeting and advertising decoding. This improvement been made by the authors reflects and conforms to the main features of the concept of Industry 4.0 in order to the fact of the gadgets communication implementation into the economy during the Fourth industrial revolution.

In the article it was demonstrated on the basis of the results of the conducted marketing research that most future marketers, managers, economists and other decision-makers) do not perceive correctly the scale and dangerous of technological changes en masse yet although they realize their appearance. Respondents also perceive that marketing tools will change under the conditions of

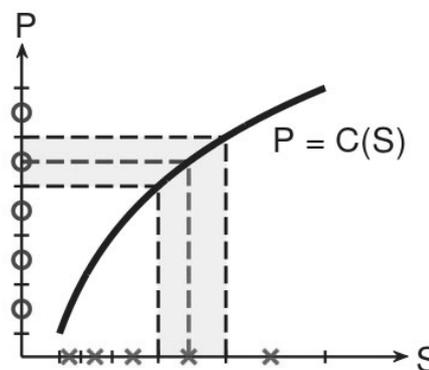


Figure 6 – The Weber-Fechner Law. The logarithmic relationship between the stimulus intensity and its perception by a human (De Langhe, Puntoni, Larrick, 2017)

economy 4.0. Such the results are explained by the fact that a human brain is able to perceive information correctly by the logarithmic way on the basis of a fewer information scope. But now a human brain doesn't use this way through previous 'educational' experience that has made humankind be indifferent to changes.

Considering the results of the conducted marketing research of the marketing perception of the technological uncertainty by the decision-makers of the companies,

it is very important for them to implement logarithmic thinking on the basis of the inferior scope of processing information at the companies. This assumes the process of deep analyzing future global and local risks and their dynamics for improving their marketing perception of the technological uncertainty and making prompt and effective decisions by the decision-makers (marketers, managers, economists) under the conditions of Industry 4.0.

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