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# New Information Technologies: Implications for Business Strategies and Marketing Communication

## Abstract

The article discusses the impact of modern information and communication technology on changes of the strategies of contemporary enterprises, the appearance of new business models, and the effects of these processes on marketing communication. A particular attention has been drawn to issues like utilization of large bodies of consumer data (including Social Big Data) in marketing operations and in managerial decision-making, data-driven marketing, Internet of Things, and predictive analytics. Furthermore, the article points to the new possibilities marketing communication can benefit from thanks to utilization of 360-degree video technology, streaming, and the general evolution of the Internet towards the so-called Web 5.0.

**Keywords:** information and communication technologies, Big Data, Internet of Things, predictive analytics, Web 5.0

## Introduction

The key to understanding the changes in consumer behaviour and consumers' quick reaction to new trends involves employing modern tech-

nologies to collect, process, and utilize vast bodies of consumer data in a marketing context, which requires a considerable level of efficiency and effectiveness of internal analytical units, as well as a close cooperation with companies specializing in market research, marketing analytics, database collection, information processing, etc. (Mróz, 2013, p. 241 et seq.).

In the era of quickly-developing and increasingly-accessible Internet, millions of gigabytes of data are collected and processed each day. It is estimated that approximately 100 hours of videos are uploaded to YouTube each hour, and there are about 85 thousand videos uploaded each day, which amounts to around 2400 gigabytes of data. Facebook's database includes over billion users, who upload 10 million videos and a billion photos to the service every month. Already in 2008, Google processed 24 petabytes of data every day, and in 2001, Jeff Bezos, Amazon's founder, said that his S3 cloud contained one billion objects. Taking into account the fact that an 'object' may be anything from a photo to a complex database, and assuming that the average size of a file is 1 megabyte, this can mean that we're talking about even an exabyte (billion gigabytes) of data. According to studies conducted in 2011 by a team of scientists from the University of Southern California, the amount of data 'stored' globally on the Internet and in devices outside the network exceeds 295 exabytes (Gutkowski, 2014). Today, such a huge body of data does not pose any major problems when it comes to the possibility of storage thereof, but the real challenge lies in analytical processing of such data and using it to make the right managerial decisions.

Many marketing managers view Big Data analytics as a wonderful remedy to improve business efficiency and to gain competitive advantage. Big Data may actually contribute to a real competitive advantage because it makes it possible to diagnose the business reality and draw conclusions in real time, on the basis of the currently-ongoing market processes. It is a great and powerful tool to gain broad knowledge about consumers and market trends, treated by many as a *Wunderwaffe* in contemporary business. However, it cannot replace strategic thinking, operating efficiency, marketing creativity, and managerial competence – although it still may boost them significantly.

Today, business managers and marketing professionals have access to vast amounts of data about consumers, which they are not always able to handle in the right way. "Data flood" is a major challenge and an is-

sue that needs to be dealt with by enterprises aspiring to become market leaders. This is pointed to by Nate Silver, an American statistician: “Every day, three times per second, we produce the equivalent of the amount of data that the Library of Congress has in its entire print collection. Most of it is... irrelevant noise. So unless you have good techniques for filtering and processing the information, you’re going to get into trouble” (Nichols, 2013, p. 62–63).

## Sources of Data About Customers and Consumers

There are plenty of sources of data about customers and consumers. The most common and most often used of these are: company websites, e-mails, on-line directories, on-line shops, contact forms, and CRM systems. In recent times, marketers have directed their attention to vast data sources that may provide them with a lot of diverse and detailed information. They are usually of smaller or larger importance, tend to be messy and not systematized, but they are still worth taking advantage of in order to be able to offer customers the best brand or business experience possible. These include:

- **social media** – the term includes a range of social networking platforms which contain a huge body of data on the basis of which it may be even possible to make short-term predictions of a given customer’s needs (Mazurek, 2012). Internet users tend to disclose a great deal of information about themselves across social media, quite often unknowingly. This concerns also very personal information and preferences such as one’s taste in films and music, or even kinship with other users. Apart from that, they share an astounding number of photos – which can be also used to gain some information. The posts they share and like, or the pages they follow are also a means that provide marketers with a very important knowledge.
- **geolocation data** – on a most basic level, technology makes it possible to utilize GPS data from a mobile device, and then display certain adverts to a given person on the basis of their location. Smartphones of users who are permanently on-line are mines of information about them. This gives marketers access to the current needs of a given consumer in a given location, which helps them immediately develop a highly-personalized offer and display information about nearby shops, restaurants, sales, etc. Geolocation data constitute

a perfect context for such information, and is a great complement thereto.

- **wearable technologies** – our clothes, shoes, or jewellery can be also packed with a range of sensors that monitor certain parameters and functions of our body, and send such data to applications integrated with them. Such solutions make us able to access information about the shape and health of a given person, or about the physical activity they undertake.
- **everyday articles connected to the Internet** – in the age of the increasingly common expansion of the Internet of Things (IoT), the equipment and devices we use to pursue our everyday activities tend to be monitored by sensors, gauges, meters, etc. This is a way to learn e.g. what a given customer is out of – and to offer them the right products in response to their needs.

## Big Data and Data-Driven Marketing

The concept of Big Data has evolved over the years, and today is still interpreted and understood in various ways. The media covering the subject usually refer to Doug Laney's definition, who stated in 2001 that it was a huge amount of data generated at a very quick rate and containing a lot of content. Big Data is based on the principle of 4V: *volume* (big amount of data), *variety* (different types of data), *velocity* (high variability, significant dynamics), and *value* (value or assessment determined on the basis of review and verification). According to Gartner's definition from 2012, Big Data is high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation. These assumptions are possible to achieve thanks to analysis and correct ways of presenting conclusions. This is why Big Data is not only about collecting and processing data, but most of all about concluding and presenting data essential for gaining certain business profits (Gutkowski, 2014; Płoszajski, 2013).

Analysis of large data volumes is applied in the following sectors: finance, telecommunications, health care, biotechnology, scientific research (especially space research), Internet industry (especially e-commerce), advertising, tourism, social networking services, information websites, as well as in industry and services of global reach. The expect-

tations of Big Data are big, and it is assumed that collecting information from every source possible (devices, the Internet) will be soon common for every enterprise, regardless of its size (today, only the biggest market players can afford it). A proper utilization of the potential of drawing conclusions from and analysing vast bodies of data will let business entities find solutions allowing them to: become more time- and cost-efficient, make good business decisions quicker, develop new products and optimized offers, as well as monitor and identify market trends. An important aspect in this context is also the automatization and simplification of organization-internal processes. The fact that data can be collected and analysed almost at the same time is also significant. Thanks to Big Data, understood as real-time analysis of vast volumes of data, companies are able to offer the recipients of their products or services (both individual and business entities) real value, corresponding to their expectations and preferences.

Data-driven marketing is a process of collecting and combining immense amounts of on-line data with off-line data, followed by an analysis of such data in real time, and making insightful observations about customers. All this is to infuse the market with highly-personalized communication. But personalization is not everything. Marketing communication needs to be not only individualized, but also consistent. In order for this to be so, marketers need to have a permanent access to – and insight into – consumer data. According to a survey carried out by Ascend2, even 93% of managers believe that integration of customer data from different channels has helped their companies develop better-tailored offers and induce appropriate interaction, which has led in effect to an increase in the quality of customer service. But approximately 44% of marketing professionals say that pursuing a consistent and logical communication with consumers in an omnichannel environment poses a real problem (Ascend2, 2015).

Big Data is something of great utility to marketers. It is a resource that can be used to establish a successful business. Data itself is not as important as what can be inferred from it, and what decisions can be made on the basis thereof. Big Data combined with an integrated corporate marketing strategy may have a major impact on the key elements of business, such as customer engagement, customer retention, customer loyalty, and optimization of marketing activities.

Contemporary marketing is not just about creative and ‘catchy’ slogans or flashy and eye-catching billboards. It is also based on sophisti-

cated analytics – to an increasingly larger extent. In a market reality, where almost all marketing activities become measurable, optimization of such activities is the first and most important commandment of every marketing professional. At present, larger and larger parts of budgets are spent on marketing, but the results of such investments are expected to be measurable and satisfying.

Big Data poses a marketing challenge not only in terms of acquiring and analysing historical data, but also with respect to forecasting. Today's algorithms are developed in a way that makes marketers able to predict a given consumer's behaviour on the basis of historical data. This becomes a very powerful tool in the hands of marketers, and if used in an inventive and creative way, it may yield excellent results.

## Social Big Data

Nowadays, marketers are well-able to closely monitor and measure customer behaviour through analysing their activities pursued across social media. Modern technology makes it possible to record such data with a great attention to detail. An average Internet user spends about 2.5 hours a day using social media, providing enterprises with huge amounts of data concerning their preferences in many different areas. It is necessary to point out that every social networking platform is different, and each of them “offers” different types of useful information.

- Facebook – the famous “Like” button is clicked 2.7 billion times a day, revealing information about the preferences of each individual user, but it is also possible to identify the latest dominant trends by analysing larger ‘clusters’ of such data;
- LinkedIn – 22% of users of the website make 500 to 999 “1<sup>st</sup> degree” professional connections, and 19% of them – from 301 to 499 of such connections. Using the information about the skills and qualifications of LinkedIn's users, it is possible to create maps of professional connections and monitor “talent clusters”, interactions between talented people, etc.
- Twitter – in 2014, the service reported a peak of 143 199 tweets published in one second (globally). Twitter makes it possible to follow topics that stir the most interest of its users in real time;
- Pinterest – over 17% of infographics comes from the “Home” category, and 12% of them is distributed over the “style” or “fashion”

categories. This is an excellent source of information about consumer preferences;

- YouTube – according to Nielsen, YouTube reaches a larger number of adult Americans aged 18–34 than any other cable TV. The website offers an insight into users' preferences for videos and music, but also into the latest trending videos, etc.
- Foursquare – the service boasts 45 million users, who have so far checked in 5 billion locations worldwide. It is a great source of information about real-time location (Smith, 2014).

## Predictive Analytics: Predicting Consumer Behaviour

Those familiar with G. Orwell's "1984" surely remember the rather shocking vision of the future, where the omnipotent and omniscient superstate and its "Thought Police" knows every recess of every citizen's soul, and is able to predict every act of dissidence. It seems that what used to be fiction is now becoming the reality, although the world of today is fortunately still far from Orwell's dystopian vision.

As for studies into consumer behaviour and taking advantage of the findings of such studies in business, it appears that the so-called predictive analytics, making it possible to fulfil the desires consumers are not yet aware of, may play a crucial part. Using data analysis, companies will be able to predict the needs of consumers before they even surface. Big e-commerce chains take advantage of this technique already today. Based on analysis of data concerning regular and repetitive shopping, they are now able to tell when the customer is going to run out of the purchased goods, and pre-empt the customer's actions by providing them with a better offer than that of the competitors. Processing data about preferences lets businesses anticipate the behaviour of customers and to predict their further purchase-related steps. This is why on-line shops may suggest products that are complementary to those already purchased, matching the offer to particular circumstances. Based on a given consumer's purchasing history, behaviour, and information shared across other channels (e.g. on social media), on-line shops may harvest data about birthdays, anniversaries, name days of their family members and friends, and then offer interesting products in special prices. Thanks to proper customer segmentation and appropriate and systematized collection of data, it is now possible



to process information about particular family members of a consumer, which helps on-line shops use these persons' preferences and address the consumer with suggestions of gifts for the former. UPS, for instance, makes use of predictive analytics to predict the requirements in the scope of maintenance of delivery vehicles. With a very big number of parcels delivered each day, each breakdown generates huge losses and leads to customers being dissatisfied with the service. Forecasting and planning of vehicle maintenance lets the company save millions of dollars on unexpected repairs and reduce the number of customer complaints. Today, other market leaders, such as Amazon, Walmart, or Zappos, rely on similar methods (Gutkowski, 2014).

A very interesting example illustrating the potential of predictive analytics is the solution used by UBS Investment Research. It involves analysing satellite photographs of parking spots available next to Walmart shops in order to improve the algorithm predicting the future financial results of the retail company. The model performs an analysis of how the number of cars parked at Walmart's parking lots is correlated with the company's quarterly results; a monthly calculation of parked cars makes it possible to determine how many customers visit these shops, and a mathematical regression model translates this information into precise estimates of the future quarterly results, updated on a monthly basis. This way UBS gains advantage over other research companies attempting to forecast Walmart's financial results by means of conventional prognostic models.

Predictive analytics is also applied in predicting various natural disasters or epidemics. An example is Google's project named *Flu Trends*. Google monitors the queries typed in the search engine to create real-time changing maps of areas threatened with a flu epidemic. In New York, in turn, there is a team of "analytical alchemists", who has managed (basing only on an analysis of commonly available data!) to improve the effectiveness of preventing fires in vacant buildings by 70%.

In e-commerce, predictive analytics makes it possible to predict not only the current needs of customers, but also their future needs. Retail networks are able to use purchasing history to make deduce – in all likelihood – if a given female shopper is pregnant, and even make an educated guess as to the month of pregnancy. This knowledge is taken advantage of by salespeople, of course, who use it to send appropriate offers to such customers at the right time.

## Internet of Things

The concept of the Internet of Things (IoT) was coined by a British entrepreneur and start-up founder, Kevin Ashton. He formed the idea first in 1999 to describe a system where the material world communicates with computers by means of omnipresent sensors. Almost a decade later, at the end of 2008 and beginning of 2009, the quantity of devices connected to the Internet exceeded the number of inhabitants of the world. That moment, according to Cisco, was the true birth of the “Internet of Things”, referred to more and more often as the “Internet of Everything”. In such context, the system is formed not only by objects, but also by processes, data, humans, and even animals or atmospheric phenomena – anything that can be treated as a variable. The idea of the Internet of Things is therefore understood as an ecosystem where objects are able to communicate with one another – with or without humans’ participation (Kolenda, 2015).

According to estimates by McKinsey Global Institute, in 2025, the global IoT market will be worth approximately at least 4 trillion dollars; in a dynamic scenario, this value is likely to be even 11 trillion dollars. According to studies by Gartner, there will be over 25 billion devices connected to the Internet by 2020. But these are still very cautious predictions; other research institutes speak of even several hundred billion objects connected to the Internet in the nearest 10 years to come (Kolenda, 2015).

The products we use on an everyday basis become a part of the network more and more often. They offer a broad spectrum of possibilities to introduce new features, escaping the limits of imagination of an average user. This forces companies to revise and analyse their operations: starting from manufacturing new products through their maintenance and use, to end with IT structure security. Enterprises face new strategic challenges, asking questions like: how to create new values for customers, what partners to work with, or how to gain competitive advantage when the borders between different industries shift dynamically (Porter and Heppelmann, 2014).

New intelligent products offer a possibility to take customer relationships to a higher level. Access to data concerning the way various products are used grants better knowledge of how customers benefit from these products, which makes it possible in turn to target product offers better, and to highlight the assets of a given product. What is more,

companies are able to remotely diagnose the loss of product efficiency or instances of failure, which is often coupled with an option to perform remote repairs, and this makes them less dependent on partners responsible for servicing and maintenance. This, in turn, translates into increased revenues and larger profit margins.

Web 3.0 gives a new set of tools to develop offers. Internet-connected devices will acquire a new significance and will become more than products used by customers. Forming a network, these devices will be able to provide customers with an added value.

The so-called *wearables* will play a very important part in marketing. This market segment has been growing for some years now, and according to forecasts, its annual value may range between 2.3–6.2 trillion dollars in 2025 (McKinsey, 2015). These devices will lead to appearance of completely new touchpoints and an immeasurable amount of consumer insights. Marketers will have the tools to accompany customers anywhere and anytime; they will be even possibly able to explore their ‘inside’, so to speak. Parameters such as blood pressure, pulse, amount or level of physical activity, body temperature, etc. will become the basis for developing tailor-made and personalized offers. This also implies an increased rate of reaction to consumer behaviour – in real time.

Solutions like *smart-home* technologies will become a gateway for marketers to consumers’ homes, which means an even greater amount of data to be processed and utilized. The rooms we spend most time in, the temperature level inside our home, the time we get and go to sleep, the expiry date of milk in the fridge, etc. – this is the data enterprises will have access to; they will use it to suit their offer to our most private and personal needs.

At present, almost half of the world’s population lives in cities. By 2020, this rate will probably grow to 70%. This urban density, combined with the omnipresence of smartphones, fuels the sector of on-demand economy in the present decade. This is an observation shared by the authors of IPG Media Lab report of 2015: “The next decade will see our cities come alive with connected devices, as the Internet of Things moves out of the home and into the streets. How we interact with our surroundings will be increasingly driven by a combination of personal data and public data. Projects like LinkNYC are beginning to unlock this potential today, with highly networked, interactive digital out-of-home. But to reach every block of every city, this new infrastructure will require

many years of unprecedented collaboration between private companies and government agencies” (IPG Media Lab, 2016).

## Web 5.0: The Internet as Emotional Web?

New technologies provide us with increasingly better tools for developing accurate behavioural profiles of Internet users, but they have been so far inadequate to let one look deeper and explore the more spiritual side of modern humans – their thoughts, feelings, and emotions. And yet, today we speak of the so-called Web 5.0 – a web that will become a gateway to human emotions. There is a project named <http://www.wefeelfine.org/> that displays results of search for phrases like “I feel” or “I am feeling”, dividing these results into categories and locations. This gives an image of how Internet users feel in a given place and at a given time. But this still doesn’t reflect the reality in full, and it therefore does not let one draw long-term, analytically and business useful conclusions. A San Francisco based company called Emotive has gone even further and created a device that makes it possible to ‘read’ human neurological activity by means of EEG technology. The obtained data combined with information about blood pressure, etc. will make it possible to examine the psychological condition of a given person at a given time (Web 1.0 vs Web 2.0..., 2015). What does it mean for marketing? New standards in advertising, new advertising space, and an increased significance of real-time activities. After all, marketing is – to a smaller or larger extent – about influencing human psyche. An opportunity to get to know what and how consumers feel, and to react to their mood in a proper way is the fondest dream of every marketer striving to strike the right chords of consumers’ souls and reach them with their offer.

In a 5.0 reality, the biggest challenge for this in charge of marketing activities will be to provide customers with even more personalized interaction to offer them emotion-rich experience in real time. Web 5.0 may transform the Internet from an environment full of media buzz into a more intimate and warm place, where interactions with users will become much friendlier and much less aggressive. On the other hand, however, it may lead to an abuse of possibilities granted by technology, and we can expect to see attempts of taking advantage of the Internet to manipulate human emotions and to conduct very dangerous psychological experiments.

## Video 360° and Streaming: New Possibilities in Marketing Communication

360° (or spherical) video is a technology of recording the whole scene/setting that surrounds us, and it can be applied with both actual videos and photos. The market already abounds with cameras to record 360° images, but the special GoPro Hero mount system seems to offer one of the best results. The system makes it possible to mount 7 to 14 cameras at the same time (depending on the model), which grants a 360-degree view of the surroundings. The 360° video technology combined with Oculus or Samsung gear lets the user get “inside” the video and watch it from every angle by turning their head. Today there is even a special software and a set of applications making it possible to connect Samsung phones (Galaxy 6 and Edge) to such digital eyewear, and this combined with headphones, lets users ‘immerse’ themselves in virtual reality (Pałys, 2015).

Companies wish to be closer to consumers, but consumers want to be closer to companies as well. In the digital world of today, consumers expect a realistic image of the reality, and a great deal of transparency. Now it’s not only marketers who have the right to know more about customers, but it works the other way round too, as customers wish to have more knowledge about the companies and products they trust. The 360° video technology is an excellent tool to enhance consumer experience. The costs of production of 360° videos will gradually fall as the equipment designed to make such videos becomes more common; after all, making interactive videos is now both increasingly feasible and tempting. You can show your product from every angle, or let your viewers follow a character or discover some artefacts hidden in a specially-designed virtual environment. Therefore, the concept opens the doors to a space for creative advertising campaigns and new ways to communicate with consumers. The first company to have a 360° video spot was Bud Light, who showed videos of its events. Viewers found it very attractive and exciting, as they could watch the whole event and its participants, turn their head to change the viewing angle, change the perspective of viewing, etc. Studies were quick to find that the engagement of viewers of 360° videos was 36% higher than in the case of traditional videos (Pałys, 2015).

This gives good reasons to assume that in the near future, the 360° video technology will become an inseparable element of every marketing

strategy, and that it's just a matter of time until we're able to view 360-degree content in all mobile systems and browsers.

Streaming is another novelty in the area of video content. It is a form of content sharing users find very engaging. People love watching various live events, performances, concerts, etc. Mainly because everything is real, something unexpected and surprising can happen any moment, and they can react to it quickly and spontaneously. "Live" communication strategies are supported by tools like Meerkat or Periscope. Application of these tools aims to improve customer relationships through comments of viewers, who can express their opinions about a given stream in real time, which provides a given company (or brand) with an instant feedback. Such solutions make communication with customers significantly better because of the offered opportunity of 'live' interaction. This can be employed as a great component of brand image building, especially when we want to show the more human side of the brand. It is possible to e.g. show an employee of a given company preparing for a business presentation, or a coffee break in the company's office.

According to forecasts, video is to make up for 69% of the whole on-line traffic by 2017. Expansion of video content is one of the seven trends to spread over the next couple of years. They will be no longer something extraordinary, but will rather become a standard, and brands will be forced to come up with ideas to stand out in business (Digital Marketing Trends..., 2015).

A step towards a much higher level is the so-called augmented reality. Some brands have already made their first (and rather careful) steps into this area as a new space to communicate with customers. At present, there are four global brands on the market that have started exploring the field of *virtual reality*. These are: Oculus Rift purchased by Facebook, Samsung Gear VR, Google's Cardboard, and Sony Morpheus – a headset that will enter the market in 2016 (Digital Marketing Trends..., 2015).

The clash between these brands will lead to emergence of a new channel of communication, where user engagement may exceed even the most daring expectations. Contextual advertising weaved into e.g. a storyline of a computer game may play a vital part in this context. For instance, the main playable character of the game will be able to have a tin of Coca-Cola because the brand has paid the developer of the game for such product placement.

## Final Remarks

It appears that in the forthcoming digital reality, which will feature new interactive platforms of communication with consumers, corporate business and marketing strategies will become even more *consumer-centric*. Consumers of the future will expect new shopping experience, where brick-and-mortar points-of-sale, the Internet, and the mobile channel will become merged and will complement one another. The key idea will be to offer a “holistic shopping experience” across many platforms. This means further expenditure on investments in IT specialists and new technological solutions. A trend involving enhanced personalization of offers of goods and services and tailor-made marketing communication will intensify – customers will expect marketers to know them, remember their previous interaction with the brand, and be able to integrate platforms and communication channels in a way to grant them a consistent experience.

It is reasonable to assume that enterprises operating in many different industries will take more and more advantage of the potential lying in Big Data analysis. Even today, many companies start gaining measurable business benefits granted by practical implementation of Big Data solutions into their business operations. But there is a darker side of the coin as well; utilization of the possibilities coming with Big Data solutions may carry quite serious consequences therewith when it comes to both business and the private sphere of our life. Consumers and Internet users tend to speak more and more often of an asymmetry in the relationships between enterprises and consumers. Another argument raised in the discussion concerns the issue that the increasing amount of data collected by enterprises and government institutions and agencies poses a threat to our freedom – and not just on-line, but rather viewed as the broadly-understood civil liberty.

From a pragmatic, managerial point of view, it is important to bear in mind that the collected data may contain errors and mistakes. Although the algorithms used on the basis of Big Data principles are becoming better and better, it is quite reasonable not to take all the conclusions drawn for granted as they may simply be wrong. There is also another fundamental issue: what will be the future of management in the decades to come? Will managerial competence, experience, and intuition give in to lifeless and nameless algorithms, extreme de-personalization of management, and marketing automation? What will be the convergence

between the human brain and the memory and increasingly better performance of computers? Will humans become more like computers (which could be expressed in e.g. management algorithmization), or will computers gain a *human touch* and become similar to the human brain?

We can see already today that companies who build their decision-making models not only on the basis of standard sources of information about their customers, but also taking geolocation data, consumer behaviour analysis, or weather data into consideration are able to react to the ever-changing market reality in real time and thus gain competitive advantage. This proactive approach is also reflected in the growing popularity of terms enriching the everyday vocabulary of marketers, such as behavioural targeting, location-based marketing, proximity marketing (based on utilization of beacons), blogvertising, on-line amplifying, etc. (Mobile Institute, 2015; Digital Marketing Trends..., 2015; Prognoza..., 2016).

To conclude, new information technologies force modern enterprises to change their business models and strategies. More and more traditional, rigid structures are becoming replaced with new flexible organizational forms concerned with a constant interaction with customers/consumers and with taking effective measures in real time.

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