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Aleksei Degterev

Algorithmic Marketing as a replacement for traditional Marketing Research

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| <p>The purpose of this paper is to evaluate an emerged trend of algorithmic marketing as a technological framework for automating marketing strategy, research process, delivery of innovative analytical approach with potential to take over traditional marketing research. Furthermore, evaluation of marketing industry applied scientific modeling methods is presented in order to ameliorate operational efficiency along with stakeholder's experience and to reach understanding, which technical knowledge areas would require to pursue a career in marketing research for future years during the informational era.</p> <p>Essentially, this work identifies intersection and differences of scientific programming, statistical data manipulation techniques of algorithmic marketing and guiding frameworks of marketing research that for the past decade have established new market standards with sophisticated algorithms, technological advancements, while release of surprising tech-solutions has rarely gone unnoticed by the wider public. In addition, possible scenarios of use for the technologies in the service sector are outlined and the reader will find a solid analysis for the deployment process of marketing research for reaching new solutions and, finally, showcase potential development fields and applied functions in the marketing domain under evolved field of "Big Data" technology. The experience of successful implementation of these technologies by companies is demonstrated for further innovative development, along with the assessment of opportunities and limitations of rising industry.</p> | |
| Keywords | Algorithmic Marketing, Marketing Strategy, Marketing Research, Scientific Programming, Big DataA |

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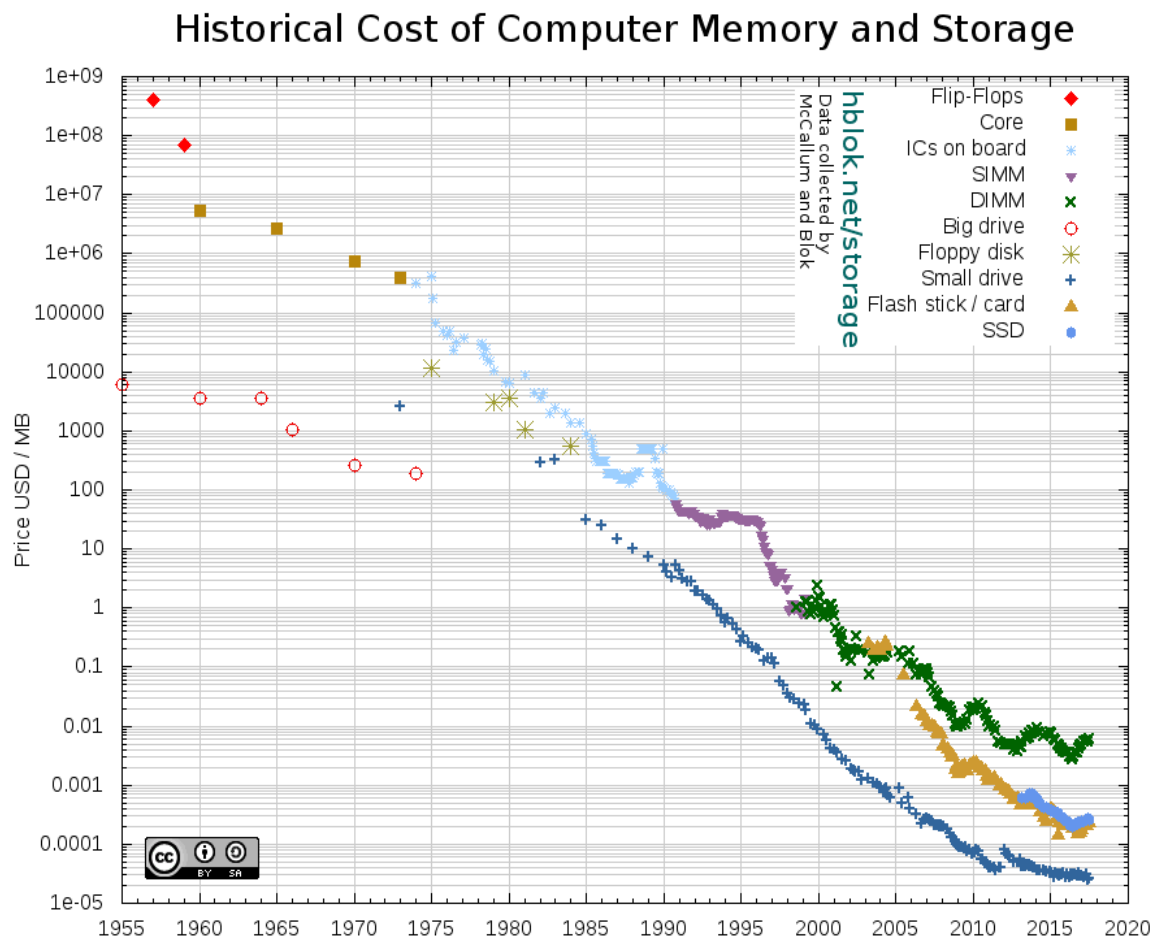
1 Introduction

"Big Data is the oil of the Economy". (Economist, 2017) Decision making processes, strategic planning, the ability to automate routine and sometimes even partially outsource creative processes of the business upon technology has driven the demand for technological channels of further improvement and growth immensely; Revenues from Global Big Data market since 2011 are forecasted to upsurge more than 10 times (Statista, 2018). In the fall 2017, according to MIT Sloan Review, more than 46% of US companies have been exposed of either fully adopting that kind of technology or engaging in pilot project for future processes and offering. The ability to allow technological development support decisions of humans, along with the ability to do it in an engaging, thrust manner, by easily coping with tremendous volumes of information has led companies to invest loads of money in order to ameliorate capabilities of making data-driven decisions and also to enhance operational efficiency.

Such expansion was driven by genuine interest to deliver unconventional solutions into the value chain schemes, while management with the ability to recognize long-standing growth opportunities, along with witnessing the success of applied projects from industry leaders is becoming less and less hesitant to introduce such initiatives involving large-scale technological expansion. As an example, according to MIT Sloan Review we are in a particularly exuberant time, where "more than 80% of the executives view AI as strategic opportunity and only 37% considered it as a risky investment at the meantime." Executives believe that Artificial Intelligence (AI) and Big Data technology can deliver a sustainable competitive advantage and consequently data-driven products and services would be the new offering in the era of informational innovations.

Factors that accompany prosperity of Big Analytics are mainly concerned with the fact that costs of technological production have had reduced significantly, which in turn means that the means of data collection (chips, tracking devices), data storage (Memory costs (as seen from Figure 1)) and data processing (software, security) have experienced tremendous boost in the efficiency, accessibility and price aspects. Therefore, it was made more attractive for investors along with business holders to pursue innovations and begin expanding optimization technology for operational improvements.

Figure 1: Historical price for storage capacity (J. McCallum, 2018)



However, Big Data cannot be considered as panacea, this technology is not new and the unprecedented scale with enormous volume of information also brought the same level of uncertainty. As McKinsey department of "Marketing and Sales" has pointed out: "...there are successful examples of companies such as Amazon and Google, where data analytics is a foundation of the enterprise. But for most legacy companies, data-analytics success has been limited to a few tests or narrow slices of the business. Very few have achieved what we would call "big impact through big data", or impact at scale". (2015: 6) Aside from risks concerned with ambiguous ROI structure, big exposure also brings bigger security risks associated with personal data, stolen information has the potential to result in disparate losses. And finally, it is merely impossible to recognize value in a complex design of analytical algorithms and systems, which makes adoption of technology, quality assessment, maintenance and influence reluctant. Therefore, initial expenses, ethical and legal concerns are not the only milestones on the path of adopting analytical technology for delivering valuable insights for current operations.

1.1 Objectives, Scope and Limitations

The goal of this paper is to contemplate the assumption that algorithmic approach in the long-term would replace traditional Marketing Research practices. To define the term algorithmic marketing, the definition given by Ilya Katsov: "Marketing process that is automated to such degree that it can be steered by setting a business objective in a marketing software system; It should be intelligent and knowledgeable enough to understand a high-level objective, such as acquisition of new customers or revenue maximization... Learn from the results to correct and optimize the actions needed." (Katsov, 2018) Rapid development of scientific methods such as mathematical modelling and optimization methods has been adopted by marketing and resulted in a sophisticated intersection of data science, stat-modeling and conventional marketing.

Scope of this work is limited to the discovery of the core differences of programmatic approach from conventional practices for each stage of the marketing research. In order to understand the influence and development of technologies for marketing industry in particular, firstly a framework of deployment is described for both algorithmic marketing research and analytical research process with focus on strategic data-driven decision making are presented in chapters 2. Further on, chapter 3 evaluates traditional methods, for the reason of achieving apprehension of effectivity and reason behind already existing technological implementations as well as to comprehend and to analyze more effectively potential development scenarios and upcoming significant changes. Assessment will mostly be done by the means of evaluating key-technological innovations and improvements that became a widely recognized practice for the companies, which value chains depend on the improved optimization provided by quantitative analysis. In chapter 4, evaluation of prospects for algorithmic marketing is presented along to realize effective comparison of methods for data collection, processing and analysis. Finally, chapter 5 describes limitations of such domains as ethics, privacy, compliance and shows application domains for the evolving field to better assess inevitable difficulties that companies eventually would face to establish integrated marketing research department.

To better evaluate data science, three main stages for analysis emerge: firstly, current state of development, secondly, empirical evidence upon existing case studies of technological integration and, finally, restrictions imposed by technology of big data

analytics. In addition, presenting valuable examples of technological innovations was made so that to assess drives for state of affairs for the current market as well as to look to discover a subtle trend direction for the picture of products, services and further advances. Practical solutions found by developers, engineers and mathematicians referenced by this work will give a reader a glimpse upon optimizing the production of crucial products and operations, which are becoming newly accustomed standards for industry leaders.

This topic was very influencing for me personally, in particular due to my limited experience in the field of data-driven marketing within a big retail company in Russia. My professional occupation led to the engagement in automated target marketing initiatives, along with designing software products based on loyalty card information. This involvement allowed evaluating current state of programmatic marketing, my perception towards traditional Marketing Research has changed beyond recognition and focus of interest has shifted towards the design of robust frameworks that aim to learn from data to optimize business operations and ameliorate both customer experience and organizational climate.

1.2 Research Methodology

The research method applied in the paper at hand can be described as qualitative with a strong focus on conducting secondary search based on several foundational works from the subjects of Marketing Research, Big Data Technology and Data Science along with various contiguous domains such as Business Intelligence, Cybernetics and Ethics. Each of them as a discipline holds an equally valuable part of importance to the design, practice and operations of algorithmic marketing. However, unfortunately, my understanding of mathematical concepts behind analytical methods is quite limited for now, therefore, this work avoids describing in-depth computing methods. Nevertheless, extensive use of fundamental materials such as published books, eBooks, whitepapers and websites would seek to overcome the barrier of technical implications in order to deliver underlying value that field of big data analytics holds for the future of marketing.

Moreover, practical experience and showcases should give a hint towards current application of analytics, design and continuous integration of complex data-driven systems that are of high concern for modern algorithmic marketing research. Experience

with project engagements is closely related to the matter of the subject and would be used to represent some of the underlying examples of big data application within algorithmic marketing sphere. The company projects were realized within a leading Russian retail-company that has extensive international reach and is listed on the London stock exchange. Naturally, success within this industry has a strong influence on the data collection/processing operational procedures including supervision of logistics, price development, client profile, geo-location, shelf availability and further more. In regards to the secondary research, the fundamental principle was to deliver the context for product ideas and try to grasp and cluster fields with similar attributes and design patterns that have a close relationship on the developmental stage of the project, however, possibility that currently popular frameworks and procedures can be a subject to quick change is inevitable, therefore, reader should bear in mind that pace and design of technology is dynamic and therefore, should be evaluated independently.

Lastly fair share of attention was given to solutions delivered by “giants” leading the field; however, my main focus was set on the internal attributes of scientific judgement and technological advancements that support strategical marketing goals and look to achieve competitive advantage rather than diving into statistical effects brought up by the Big Data. Consequently, main design approach for this research was to figure out systematic factors, drives and empirical evidence to support not exclusively decision-making structures for product design and general development, but also to provide a comprehensive understanding of the design patterns, interest concerns for the customer, clients position in the form of a vast class description of informational features that compromise modern automated business research process.

1.3 Literature Review

As the topic suggests algorithmic marketing cannot be evaluated solemnly from technological, programmatic perspective, as it involves understanding over business operations, strategic marketing, informational theory and etc. Therefore, material attempts to setup a cross-disciplinary understanding of the discussed field by presenting different views from recognized conceptions, along with expert opinions that have shed light on the prospects and vague practices of the market. To deliver a solid judgement support framework over the issue, the intersection of four basic disciplines was picked to compose a core structure of focus and to direct further investigation: Marketing,

Product Strategy, Analytics and Big Data technology. Each of them represents a meaningful independent role within the marketing innovational field and has the potential develop well-thought out analysis for subject of the matter. The list of modern thinkers presented below consists of professors and world leaders related to the concerned field of studies, my views on future data science advancements and anticipated innovations in marketing were formed under their respected influence.

As for general direction of the industry and strategical insights the decision was made to focus on the principles of opinion-leaders in the field of strategic marketing: Philip Kotler (Marketing Professor, founder for modern discipline of strategic marketing) and Ilya Katsov (specialist in the field of algorithmic marketing); Kotler delivers general judgement framework that applies to marketing seller-customer relationship and is fundamental for modern marketing research overall, while Katsov delivers robust approach to quantitatively evaluate factors of marketing mix and perceive risks of informational business in an unintuitive programmatic manner.

For the matter of marketing analytics, foundational work that outlines necessary structure and provides measurable customer-centric strategies is "Cutting-edge marketing analytics" written by Rajkumar Venkatesan, Paul Farris and Ronald Wilcox. Their studies to be refreshingly practical and provide a map to leverage data-driven techniques, useful outline of the current technological, collaborative techniques that derive value from customer analytics. Moreover, the material presented by Venkatesan has demonstrated wide variety of intelligent marketing research applications that lead to practical outline of examples of the analytical techniques from famous "Moneyball" regression to the significant recommendation system-design breakthrough for the community of "Netflix", in each case he managed to describe, how and what were the underlying success factors during the marketing research procedure. Other case studies provided as examples on this paper were mainly taken from personal experience, along with studies presented by British consultant Marr Bernard, who has extensive and fruitful expertise in the domain of Big Data, during his the research Big data is discussed extensively and cited journal articles or reports were quite useful for insights that were extracted to compose the brief picture of current technological "meta" in AI development within this limited paper. Case study examples from those sources are widely used in

order to pursue understanding in the potential benefits delivered by theoretical frameworks of analytical tools.

In order to examine technological implementation of data science field, the literature of software design, algorithmic and scientific background sources were consulted including scientific journal articles, video-conferences such as "PyData", "LMLP" and various online resources maintained by well-known publishers such as "MIT Sloan School of Management", "McKinsey institute", "EY". One of the core manuals for applied strategical big data integration was written by Robert Stackowiak et al. (2015), which is called "Big Data and the Internet of things", eventually it outlines possible solutions for designing architecture, organizational standards, planning team skill structure and approaches of integrating such a complex technological unit as "Big Data". To conclude, the technical aspect of algorithmic design frameworks from Business Intelligence specialist – Manohar Swamynathan were used from his manual "Mastering Machine Learning with Python in Six Steps" (2017) and the textbook presented by Joel Grus "Data Science from Scratch: First Principles with Python" (2017). Both of them provided extensive foundation of mathematical modeling, analysis methods, probability and data preprocessing. Obviously, mathematical computation designs was not included, however, the goal of this paper was still to compose a relevant general idea of what, why and where is applied for different stages of market assessment in the section of 3.4 "Applied analysis methods". Reader would be able to discover interesting outlay of innovations of the field of intelligent technologies such as natural text processing, computer vision, or merely examples of successful project application.

2 Research Deployment

Marketing research was introduced as early as human existence; it became quite useful to satisfy his needs of evaluating opportunities from rational stance as a simple form of exchange measure for his time and goods. Moreover, it is an essential component of any social environment as eventually serenity, security, health benefits have prevailed among other skills for the first tribes and they developed communicational abilities to coexist. Even though, difficulty of connecting our distant past with modern complex-evolved systems is apparent, as current society produces billions of informational transactions and exchange is driven by machines with pre-designed decision-making algorithms. However, this subtle connection appears to be based on the same basic principles of the

functional society of supply and demand. This concept delivers a priceless notion of an equilibrium point, at which the best possible exchange occurs: buyers receive highest possible reward for their goods and services, while sellers are able to secure those goods at the best price and to satisfy his core needs, wants and beliefs holding all else equal. To find this optimal point, marketing introduces us with a system called marketing mix (McCarthy, 1960), which is a method of assessing communication between both parties with Product, Promotion, Price and Place. Those factors allow to anticipate behavior of buyer and seller and understand the drives, milestones for each exchange transaction.

Introduction has uncovered the recent upswing of the demand for analytical instruments; Technological change has presented another level of reciprocity between seller and buyer, currently not only can we offer the product at more accurate price level, but recommend and personalize offering based on the individual's habits and past purchases. The integration of technology allows monitoring clients' historical activity so that service, product holders are able to extract most delicate information of his daily routine from groceries up to his favorite work route. Reason behind such accuracy is that capabilities of storing, supporting and computing have been introduced with a drastically deflated price (as was mentioned on the Figure 1). Consequently, traditional marketing was one of the first domains to integrate technology into value chain with the purpose of optimizing marketing mix factors. Finally, companies received the possibility to consider each customer individually, along with establishing efficiency indicators across production line. More precisely, if marketing channels five years ago were mostly bias to generalization and were concerned with printed media, local audience, TV, radio and external banners, modern approach introduced content marketing and target advertising practices. Data auctions have emerged to make monetization of aggregated data for companies like retailers, mobile operators, web business much easier, while companies with restricted exposure to the market have received easier access to worldwide range of diverse audience for an affordable price.

The ability to store information and produce complex non-linear calculations on the machines has greatly extended human capability to understand underlining laws, ecosystems, design models that provide a rather stable predictions for the future conditions of the environments, which means our approximation capabilities are at the

unprecedentedly high level of availability. As we have found out earlier, algorithmic marketing essentially evolved as a tool for management (individual, organizational) to fight with uncertainty, the instruments behind this tool provide leading team with situation analysis that identifies potential threats, opportunities and symptoms. Moreover, the ability to critically evaluate current marketing position and begin structured strategic approach to problem solving, finally, present rational judgement over conditions and competitors on the market, those factors are deducted after scrupulous analysis and marketing analytical organizational planning that is called research process. However, it is essential to remember that the technology is still a subject to human design mistakes, which occur during the planning and programming phase and it can harm the results brought up with new services and furthermore, marketing notions of marketing mix of Product, Promotion, Price and Place still provide us with the intrinsic uncertainty in complex systems, along with unpredictable environmental factors, which are not subject to prior planning.

2.1 Problem Statement

Whenever business perspective market is concerned, the relationship between both buyers and sellers should be analyzed together, where sellers are interested in influencing buyers' behavior by increasing demand in return for profit; As being able to supply product at the optimal point of consumer's interest and businesses reward is the goal of predictive analytics. Designing a strategy to align shareholders expectations and customer needs, wants, beliefs is concerned mainly with the external structure of the problem statement, how elements are connected, what market conditions we are in, product attributes and how well the company is prepared to face current competition. Therefore, interpreting and connecting the findings with business performance is essential only if the assessing party understands the examining subject in a deep and integrated manner. In other words, marketing analytics that is concerned only with metrics and statistics may get lost in the wrong confidence of metrics and non-scaling instruments by narrowing the picture of current business operations too much.

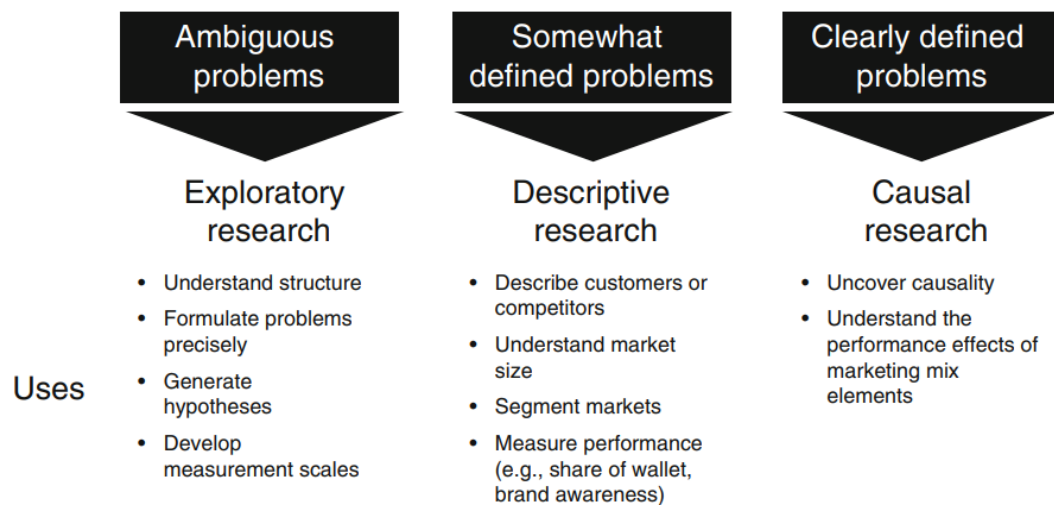
To formulate a well-thought view over the discipline, we will evaluate two existing practices that are widely spread to tackle the intrinsic issue of analytics: conventional marketing research and algorithmic marketing. Both domains could be regarded as a mixture of data-informed marketing data-driven marketing for strategic decision-making.

Proper evaluation of external environment not only considering the internal structure, but evaluating the industry exposure, rivalry conditions, support structure, which is vital for any business. Therefore, project managers or branch directors aside from excellent communicational skills should be able to provide the data-driven part of the team (marketing researcher, analytics, software engineers) with guiding advice, support and even managerial guidance due to their ability to provide a bigger picture of concern and to keep stakeholder goals in touch. In order to fully comprehend, how should algorithmic marketing be organized in practice, we should not only recognize steps followed by traditional Marketing Research, but to discover, how Big Data has changed the view of traditional approaches, why hypothesis testing or customer assessment became easier and how deployment of such a grand scale occurs in modern era of digital technology. Therefore, the composition of this work will consist of two layers: macro-managerial perspective (Strategy, Design) discussed in chapter 2 and later, in chapter 3, 4 focus would be shifted both traditional marketing research and recently emerged field of algorithmic marketing to evaluate their relationship.

2.2 Informational Needs

Unfortunately, in real world most of the problems are ambiguous, or with rather distorted perception of initial unsatisfaction, meaning that problems arise in the environment that is complex and may not be easily quantifiable (communication, management). While problems concerned with price, loyalty, demand, employee satisfaction have a long history of indirect assessment, some domains require designing special key performance metrics to improve feedback system. Consequently, whenever management comes up with new product, idea or strategy they have to be carefully analyzed in regards to existing data (market share, exposure, demand from public) to fit the needs of the company, so that discovery of possible milestones can be supported by pure facts. As an example, to predict value for attributes of the new product and evaluate potential market share one of the design metrics could be used that is called conjoint analysis; which helps managers determine the preferences of customers and potential customers (R. Vankatesan, 2014: 55). For business predicting ROI for a new product is highly valuable, as shareholders should be able to evaluate projects by their intrinsic potential cost and minimize the number of "false positive" (unsuccessfully launched) products.

Figure 2: Research design types (E.Mooi et al. 2018)



Ultimately, to properly realize the issue first requirement is to evaluate the problem from higher perspective, so that analytical strategy and business direction correspond to each other. As the Figure 2 depicts, Erik Mooi has identified a general framework for existing approaches towards different levels of certainty for given problems, along with types of accompanied research. Management is required to differentiate between those fields of analysis in order to set out proper management practices and communication systems, as the design of analytical procedure is a direct cause for utility delivery.

Exploratory research is concerned with observation, hypothesis testing, focus groups, and is one of the most popular practices that are upheld by algorithmic marketing, which is concerned with the ability to evaluate and monitor experiments in the field. The ability to deploy a survey or promotional campaign through different designs with target marketing, while designing a feedback cycle from platforms such as "Google.com" or from social networks such as "Instagram", "Facebook", "YouTube", provides a way to measure users activity in term of the viewership statistics, appreciation (likes, positive comments, shares) which gives a researcher a clear, concise idea of measuring interest. This conversion rate can be a factor of a successful marketing campaign, therefore, monitoring customer behavior with this method might show utility in the long-term analytics.

To further explain findings from exploratory research, descriptive approach is used, it delivers statistical frameworks and methods to translate underlying patterns into useful insights such as customer profile, market segmentation, performance measurements by discovering causality, dependencies, discrete reasoning from data, as an example complex user-group structure that has similar buying behavior. Obviously, this is one of the most prevalent analysis approaches as well due to the nature of technological advancements: it allows us to monitor preferences, purchases, along with personal information in a much easier fashion, which in return gives a trust-worthy client portrait that provides advertisers with habits, behavior and allows careful selection of target audience for their campaigns. Technology allows processing large number of client profiles quickly, to add public information from social media, surveys, in turn the quality of such information may identify gaps in communication, customer service, supplied material, operational networks along with direct external monetization through capitalizing valuable data on the RTB-platforms (Real-Time Bidding).

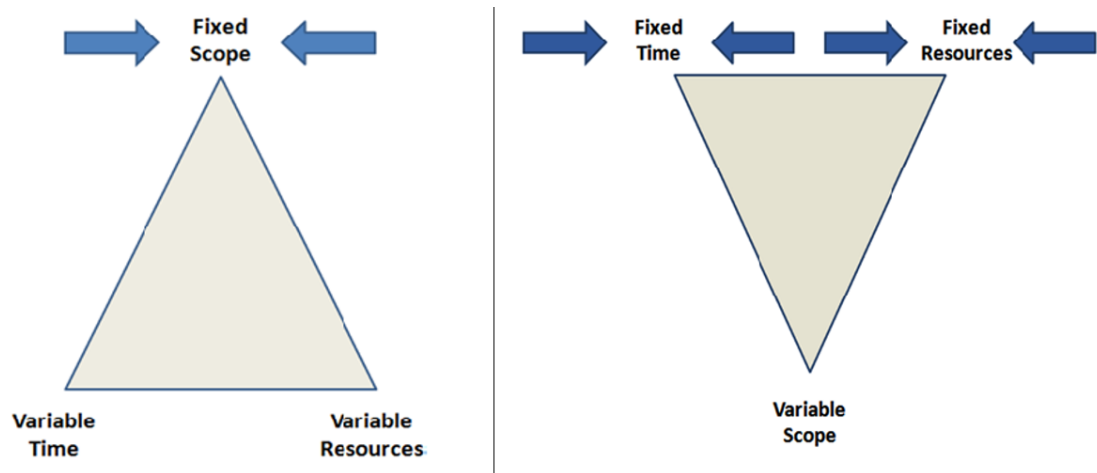
Finally, causal research refers to relationship of interdependent variables in terms of time, season, income, inflation and marketing mix. This research is aimed to discover operational challenges and opportunities, analysis is more sophisticated, however, notion of technological distancing is widely applied here as well: the ability to selectively choose promotional channels, manipulate delivery structures allows much more effective programmatic design as receiving customer feedback or processing large amounts of data became incomparably quicker.

2.3 Design Process

Key concerns of the board of directors now more than ever should be concerned with putting time and effort into enhancing the service of customer experience internally or externally, thus, holding in mind a research design or project-determined objectives should be evaluated at first. As suggested by R. Stackowiak (2015), general approach towards the design of big data warehousing and software deployment might be called agile, where the need for innovation and product implementation is considered to be perpetual, constant maintenance and updates on the existing products are key for the competitive service with analytical focus. Consequently, it has an impact on launching the research framework as well, as opposed to the waterfall approach the decisive factor is resources that are being allocated before the start of the project, so that IT and

business side would have an equal vote, while design efforts would have distinct time frames, as well as clearer evaluation due to restricted scope of sources (Figure 3). During undertaken projects it is highly important that members of the team be it development team of engineers or analytical crew under rigorous management have aligned values and goals, as it is difficult to maintain a certain direction of activity without having a concise agreement regarding the final point.

Figure 3: From waterfall to agile design approach (R.Stackowiak et al., 2015)



For this reason, agile approach for analytics led to the rise of certain technology (JIRA, Confluence, Kanban) and precise time periods (120 days at most for projects) for the IT sphere, which has predetermined success rate and velocity at which strategies were implemented. In terms of practices, several matured designs have delivered data warehousing frameworks with quick and understandable solutions that are not subject to a difficult, time-consuming customizable server/workload selection process. Among them widest applicable are:

- data models with horizontal analytic solutions (predesigned starting software)
- servers and storage architecture (configured appliance-like platform)
- analytical software (SAP, SPSS, RStudio, Python, MS Excel)

Given that the demands for storage, velocity and speed are ever-growing, those solutions delivered by software companies, consultants lead to faster business need realization and allowed companies design their own feedback, strategical frameworks with ease and efficiency, which is crucial for the informational age. On the final note, even though

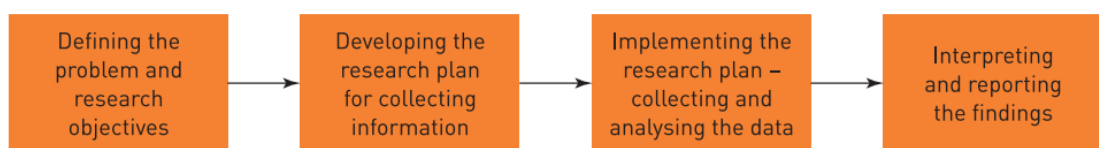
business environment might seem quite rigorous, the ability to maintain positive attitude and new-ideas-friendly environment is crucial for the success for corporate, as this job requires perpetual intensive market game, where gatekeepers have limited powers over the innovative trending force that brings something new to the table.

3 Conventional Marketing Research Process

In order to properly answer the question of relevance for traditional marketing, we are going to cover key steps that are undertaken for delivering market assessment, while outlining main differences in approaches, frameworks and philosophy from the position of traditional research process. Main goal of conventional marketing research is to identify factors of the market such as size, competition, motivations, in other words, as well as algorithmic marketing it seeks to support decision making for managers and executives.

Figure 4, depicts research process that has similar outlay for both algorithmic and traditional marketing, however, further on, chapter 4 will explicitly cover the stage-wise difference for algorithmic research such as development of data collection, data processing, analytical framework. While algorithmic marketing tends to program or numerically justify discrepancies or patterns in data, in marketing research the job of arriving at insights and conclusions requires consultant to do extensive amount of hands-on research in order to pursue logical explanation. It should be controlled and conducted properly, so that every stage follows scrupulous check and necessary analysis completed.

Figure 4: The marketing research process (P. Kotler et al., 2005)



3.1 Data Collection

To begin with, conventional research support both qualitative and quantitative gathering of information. Qualitative explicitly refers to the discovery of underlying drives, motivations for consumers behavior, which requires gathering a representative opinion-group, managing sessions, controlling bias risks, while quantitative analysis is concerned with sufficient amount of statistically representative volume of data: mails, tweets or

preferably structured interviews. Furthermore, it is based on communicational approach rather than pure mathematical analysis, traditionally it has been composed of two collection methods: primary and secondary. While, secondary research is mostly focused on internal and external historical data collection (balance sheets, inventory, competition, internet etc.), primary research, establishes an approach of gathering data (surveys, experiment), contact method usually direct user-assessment by phone, email, real dialogue. It is designed to find user expectations by asking questions. Finally, as for technology there is a possibility to work with quantifiable metrics to seek insights from surveys, structured interviews by statistical analysis.

One of flaws of marketing research assessment practices is that unless strategical research is not done on the secondary data it takes more time to deliver insights or propose a clear theory, while size of respondents is usually much smaller due to the nature of analysis (primary research design). It takes months to get results from surveys, interviews as establishing communicational system, choosing segment, managing assessment, coming up with the results presentation is exhaustive and extremely time-consuming process. Starting point for initiating marketing research is to form a problem statement from a point of an-end user, even make up a starting theory to deductively identify influences and reasoning behind preferences, stimulus and behavior patterns in order to improve business units to suit such expectation or to improve customers understanding to enhance sales opportunities. Moreover, assessment results are subject to design mistakes as asking questions approach delivers only answers to the known issues, questions, while hidden problems are left without attention. Therefore, it is intrinsically difficult to avoid potential data collection risks, for instance, demanding questions requires certain attention and honesty from the interviewer, while answering them under time-constraints or with a paid incentive leads to biased responses. "Data collection can be done by the company's marketing research staff or, more usually, by outside firms. However, outside firms that specialise in data collection can often do the job more quickly and at lower cost." (P. Kotler et al., 2005: 360). Therefore, usually designing collection procedure is outsourced to business that specifically focus on such type of data "scraping", while researcher occupies the role of intermediary to asses working environment of an organization, analyze findings and communicate results

On the other hand, algorithmic marketing is concerned with secondary information as the only source of supply for insights, complex scientific models allow discovering most crucial business weakness, opportunities in order to leverage improvement, while understanding is achieved through inductive observation of given data attributes and shape to formulate final recommendation, course of action. Therefore, technology for data collection are built in the operational cycle in order to specifically integrate sales, demand, customer data, logistics information for further improvement and scaling. Data gathered by this type of research may be subject to initial bias as well, however, the perspective of data collector is usually designed by direct extraction of existing data, therefore, skipping human intervention for the most part of extraction for every delivered sample as happens in the case of asking questions. Finally, the company is extremely careful with internal data and keeps more control over the collection process and data quality by using its staff or analytical team along with launching a full-scale intelligent system that track security, data uploading, communication channels and storage issues to combine deeper understanding over the basic functions of an enterprise.

3.2 Data Processing

The difference in the approach of data processing is not crucial as both algorithmic marketing and marketing research aim to deliver cleaned data that could maximize informative qualities of data, while evaluate level of confidence, bias, data entry errors, missing information etc. However, processing technology is essential to deliver fast, concise data preparation as technology; while it plays a vital role for scientific research – algorithmic marketing is heavily reliant on establishing powerful intelligent, yet flexible solutions to perform storing, preprocessing and analyzing data in a secure, quick and reliable manner, which allows to perform analytical modelling efficiently. For this reason we will cover technology that is being used in-depth in chapter 4.2, where relevant languages and approaches to data management are discussed in order to understand differences that arise whenever the organization decides to integrate informational processing within operational activities for further development.

3.3 Analytical Approach

Marketing research presents an opportunity to derive the function of market-system for consumer, customer and wider public. Improved understanding of underlying causalities or patterns in behavior comes from recognized techniques of descriptive statistics such as regression analysis, clustering, principal component and etc. The level of sophistication depends on the given problem, however, modeling is not central part for

conventional marketing research, as it is much more concerned with understanding the reason of such behavior rather than distinct function of demand for certain product in the past. In turn, flexibility and creativity required to perform such deductive approach, along with patience should be outstanding. However, that is why after the analysis has been delivered and processed – phase of presentations and deliverables begins.

Interpreting the results for traditional marketing is essential, as managers who are willing to examine findings usually have much higher expertise in internal business conditions and functions, while researcher presents weaknesses of those. Evidently, realizing strong discussion, looking to achieve firm understanding for underlying findings and discrepancies may result in a better combined regard to the underlying problem. While cold reasoning and mathematical computing usually stands on the inductive point of view that findings should “talk for themselves”. Therefore, research should be engaging, helpful and aim to enhance insights, share openly results, forecast performance and discuss limits, opportunities with management rather than simply communicate results.

4 Algorithmic Marketing Process

In general data-driven business intelligence is not something new, man has always tried to model the universe around him based on the information that he received. More widely, the data collection, analysis and consequent strategic evaluation methods are studied more widely in the field of “Data Science” and “Marketing Research”, however, Algorithmic Marketing can be regarded as subsidiary of two. Whenever companies received the ability to follow customer along his journey to map his habits, preferences and choices to the business road map, they have discovered communicational tool and feedback systems that had exponential rewards for those who would be ready to put time and effort into that careful optimized planning. Companies who tried to form well designed survey systems, find what was attractive to their customers, provide brand recognition and align external brand image with strategy were able to prosper and steadily develop their growth along with horizontal and vertical integration. In other words, Big Data has provided a perfect environment for experiments, design, planning and management to realize creative ideas, follow KPIs, consider market, competition and realize many more actions for the general, purpose of assessing business environment in order to function in accordance with the standards of managerial board, raise shareholder value, while continuously improve intrinsic customer experience and own

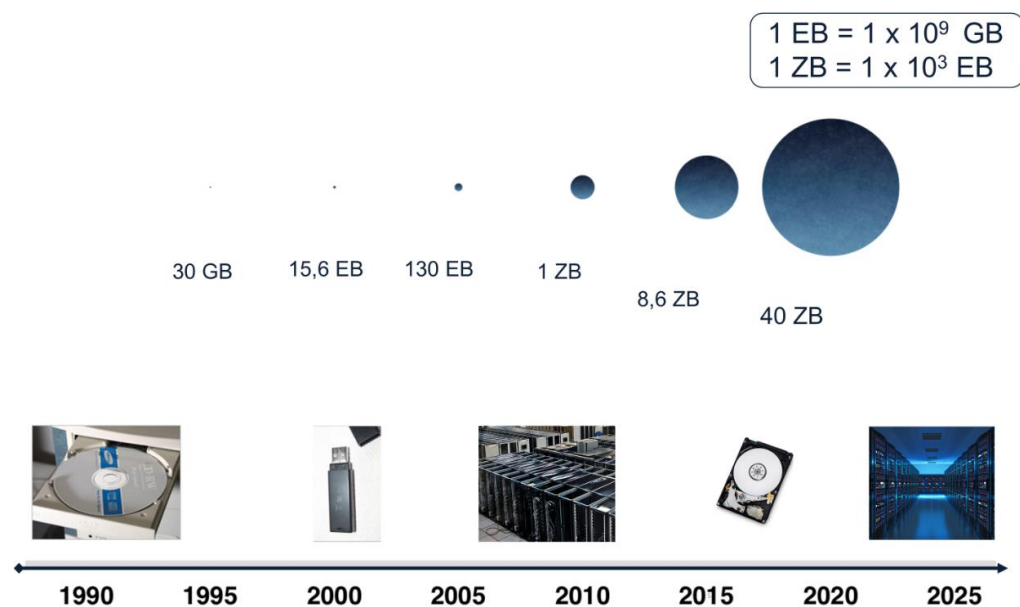
expertise in the field to provide up-to-date goods and services. For instance, “McDonald’s” executive team has transitioned to data-driven decision-making quite a while ago, currently they focus on predictive analytics (design, consumption, trends) to deliver best drive-through experience along with overall increase in supply chain effectiveness, therefore, relevant data and insights are collected through marketing system (Situational factors, performance KPIs, Marketing Mix factors) for the purpose of obtaining information that can ameliorate customer experience. The process of manipulating those causal or independent variables of the marketing system is considered to be data analysis with the ability to provide switch traits to deliver an experimental environment to further solidify certainty and execute core decision operational process on the empirically-supported basis.

4.1 Collection of Data

Artificial intelligence is a broad term that describes an area of domain knowledge, where people aim to teach technology to process habitually human tasks, for instance, popular categories for supervised learning are robotics, computer vision, speech recognition and natural language processing. Each of those categories relies on the deliberately stored data (emails, clicks, dates, views, profile, expert systems etc.), which in turn provides business and companies with opportunities for future decision-making based on pre-determined effect-measuring data framework. As an example of successful data collection procedure, the outline of a small success story would be presented behind London’s butcher shop “Pendleton & Son Butchers” that had struggled to compete with a local supermarket, where the price advantage would not provide business with a stable financial position and a sufficient demand from public. Son of the founder, has reached out to a Big Data consultant, who helped him design KPI sensors that were recording how many people passed by and finally, came in the store. The surprising insight was that busiest time of the day (aside from lunchtime) in terms of people who passed by was from 9 p.m. to midnight, where folks were heading home from the popular pub around the corner. Trial period showed that serving them hotdogs and burgers, while focusing the advertising signs around simple, yet delicious recipes instead of focusing on the price deals was a particularly profitable affair. (B. Marr, 2016: 51) Moreover, trial-opening for three-hour timespan showed specifically high revenues as folks found the place to be convenient making returns for Pendletons much more stable.

Main cause for such a booming popularity of big data is the effectiveness of methods and technological progress in storing, preprocessing, using the data that has been achieved by humanity. Moreover, as the graph depicts, in less than a decade we have surpassed the produced volume 40 times over; Exponential growth of stored/produced data led to consequent changes in processing, analysis capabilities of data; Instruments such as NoSQL Databases with distributed computing, more expressive data flows allow not only market leaders use and analyze daily petabytes of data extremely cost-effectively, but also small business have more opportunities to integrate technology such as sensors, databases, models with cloud services and ready-to-launch software at a cheaper price and wider support due to higher popularity of services.

Figure 5: Estimated amount of data produced yearly



Evidently, after technology allowed to collect so much data without harming extraction possibilities, we have arrived at the era, where every little step counts and matters, as sometimes analytics may bring to the table insights from data that we considered irrelevant. Therefore, using this philosophy companies do not disregard any information and services such as "Google", "Facebook" provide in-depth profile structures for their users (i.e. session durations, device types, location, activities), sometimes information may even describe the actions taken on the website (where clicked, how cursor moved) as those may help a lot for website structure optimization and facilitate interaction of the user, while holding stakeholders values in tact with stakeholder's concerns.

Moreover, as was stated above there are plenty of machine learning categories from textual to image recognition, those come from very different fields and often find a lot of concerns and application in commerce, where marketing plays one of the essential parts. In terms of the strategy achieving sustainable advantage over competitors still is one of the key goals, while adapting to environment changes now requires a lot more effort to compete on the level of technology. If business had a slightly generalized picture of their customers before, now they are able to find extensive information such as age, interests, family members, working position etc. depending on the designed data collection tool, which allows to combine those elements into rather distinct image of customer and consequently market products based on a) implicit info, such as registration data: name, address, occupation; b) explicit info, such as preferences: decision making, product choice, behavioral patterns, user category or it can be a handmade KPI such as consumed weight of product per week. To elaborate on the last point, the value of technology should be mainly considered as facilitating for key business activities, it provides managers with an essential adaptive instrument that allows high market exposure with a decent representation of each customer. Moreover, it delivers methods of optimizing current business activities, functions, which brings to the table the ability to quickly adopt and meet new demands. All in all, evolution of supportive technology now allows much deeper and closer look at the current customer of the business. As more and more companies focus their key-competitive traits around customer service, that kind of information is essential as it allows to sample and segment clients with much higher precision, even to form individual proposals in terms of past behaviors and similarities among customers. Therefore, business values can understand client behavior better due to: well-rounded client's profile, horizontal/vertical integration monetization, more feedback, faster reciprocity along value chain, other Marketing Mix elements from logistics to design of promotion and procurement.

4.2 Data Processing

With the rise of popularity of big data analysis, old tools such as SPSS, SAS or MS Excel started to slowly fall behind the scalable and robust languages such as R, Python, Scala etc.; even though, they require a user certain amount of time to get used to the application procedures and methods/libraries that accompany analysis bring immense boost in performance of handling large datasets, functionality is limited to your working knowledge of the language, very fast adoption towards technology with extensive

community support. As you can see from the Table 1, J. Kromme has composed quite an extensive comparison for the instruments that help preprocess data. The main difference comes as licensing and interface support, modern dynamic programmatic languages bring much higher flexibility as they are adopted to tool design, freely distributed, have outstanding documentation, however, in turn have slightly steeper learning curve due to dependency installation, general framework understanding. Finally, processing capabilities depend solely on your RAM, processing power of your Personal Computer, while tools such as MS Excel, SPSS, SAS have upper bound limits for the amount information that they are able to process.

| | SAS | SPSS | R | Python |
|---------------|--|---|---|---|
| Advantages | <ol style="list-style-type: none"> 1. High adoption rate in major industries 2. Flow based interface with drag and drop 3. Official support 4. Handling large datasets 5. 'PROC SQL' | <ol style="list-style-type: none"> 1. Used a lot in universities 2. Good user interface with extensive documentation 3. Click & Play functionality 4. Writing code made easy using the 'paste' button. 5. Official support | <ol style="list-style-type: none"> 1. Big community who creates libraries 2. Free 3. Early adopter in explanatory and predictive modeling. 4. Easy to connect to data sources, including NoSQL and webscraping. | <ol style="list-style-type: none"> 1. Scalability 2. General purpose language 3. Easy to learn 4. Good in machine learning 5. Big community 6. Free |
| Disadvantages | <ol style="list-style-type: none"> 1. Relatively high cost 2. For not-standard options not in interface, you'll need to write the code 3. Slow adapting to new techniques 4. Different programs for visualization or Data Mining | <ol style="list-style-type: none"> 1. Relatively high cost 2. different licenses for different functionalities. 3. Syntax limited 4. Slow adapting to new techniques 5. Slow in handling large datasets | <ol style="list-style-type: none"> 1. Can be slow with big datasets 2. Steep learning curve 3. No official support 4. No user interface | <ol style="list-style-type: none"> 1. Not as strong in explanatory modeling 2. Choice of version: 2.7 or 3.5? 3. No user interface 4. No official support |

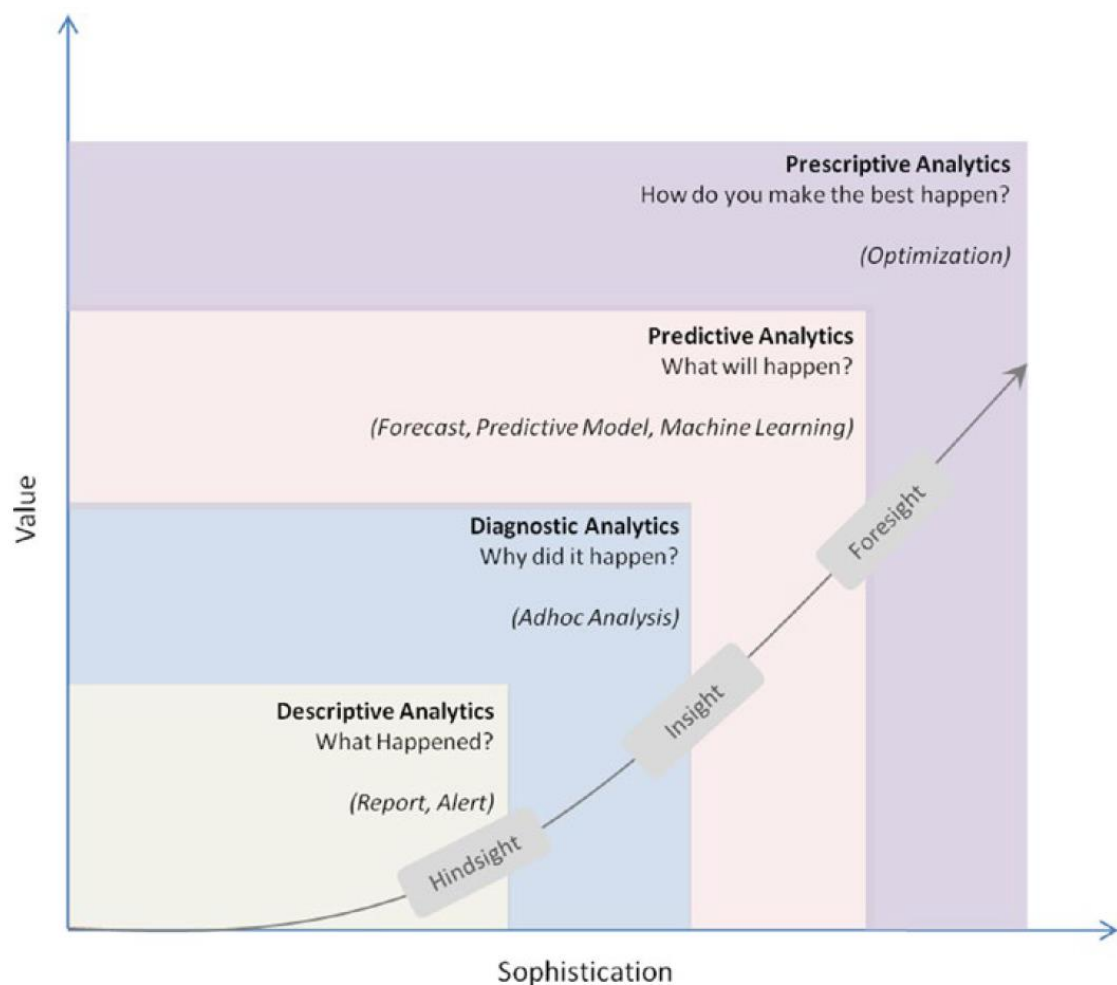
Table 1: Cross-tool comparison (J. Kromme, 2017)

In general, marketing analysts are required to preprocess given information for further analysis and procedures, mainly this information is stored in numerical format: i.e. age, transactions, bank card numbers, clicks, views; or categorical format: e.g. gender, address. However, some of the input features can be a little less straight-forwards, for instance, to provide sentiment analysis for textual survey, or even to analyze the text category popularity with a frequency approach – it requires a lot of concise and case-oriented actions to provide machines with logical representation of data. As an example, we might choose certain symbols to represent sentiment of the text fragment: exclamation, question marks, smiles should correctly provide meaning (emotion), basically, it is a process of inspecting, cleaning, transforming and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision making. This process is also concerned with Business Analytics and is widely used in many industries to allow organizations use the science of examining raw data with the purpose of drawing conclusions and making better business decisions.

Therefore, current machine learning requires additional preprocessing step to deliver proper analytics, which depends mainly on the nature of the task. Changes brought by the technological evolution not only require people occupied with marketing research to acquire more discrete, specialized apprenticeship in statistics, calculus, but also stress the importance of learning programming languages to have the ability to process huge amounts of data, design customizable visualizations for derived insights with instruments such as Power-bi or Tableau, which puts up even more pressure. However, such an immense growth of requirements brings to the table much more utility in terms of the processing power and creative potential, changes can be applied much quicker, while analysis can be automated to exclude routine repetitive tasks of modern bureaucracy.

4.3 Analytical Frameworks

Figure 6: Data analytic types (M. Swamynathan, 2017)



As M. Swamynathan in the Figure 6 suggests, basic analysis can be divided into four distinct categories: descriptive, diagnostic, predictive and prescriptive; Those categories

provide robust methods or approaches to solve the presented problems for qualitative changes in ROI, or to facilitate business processes depending on the environment and framework of the presented problem. First group of tools is descriptive, the most common and wide-spread type of analysis, where the deliverables are fixed and have a standardized framework, for instance, highly popular metrics are average, mean, percentage deltas etc. We often see similar kind of information in the form of operational variables: historical stock price changes, sales, revenue, inventory turnover, presentations; They are immensely popular in the fields of Finance, Accounting, which try to communicate, report current business environment conditions and results of company's procedures for the past three months (quarter). Other example would be, report on the marketing campaigns showing the consumption of the product on the prior and posterior distributions, which has certain insights on the behavior of the customer, as well as on the relative conditions that are predefined before experiment takes place.

Second type of analysis boils down to issue discovery, the purpose of diagnosis is to deliver the root problem for a specified issue. Among the instruments are correlation, causation, data discovery; Those help the problem by delivering new dependencies and assessment of the business process as an ecosystem. The questions vary from best promotional channel identification to improving fidelity of clients. Those two analysis frameworks aim at accurate predictions and action prescription, they are concerned with more complex matter that tries to predict the probability of event happening, as well as extracts insightful patterns from historical behavior of the subject to plan further activity. Tools include all of the written above along with the algorithms specifically designed to solve complex modelling questions that use calculus and linear algebra, more sophisticated statistics (Bayesian probabilities, time-series analysis).

4.4 Applied Analysis Methods

Basic structure of analysis depends on the given problem, if the task is for instance to design a visualization tableau then descriptive statistics could be sufficient enough with a help of instruments such as Power-Bi, Qlikview, Spotfire, D3, however, if the business faces a complex problem such as client segmentation on the income level or designing pattern recognition system for stock exchange trading bot then the depth of analysis goes up a notch. Big data products do not rely on fixed material basis, rather it relies on the informational flow, where the programmer or product owner determines the level of

flexibility. Processes of analytics, chatbot channels, interdependent personalization, audience segmentation, CTA pages – all those concepts are based on the notion that technology have enabled ability to recognize and optimize the information on a given pattern and instantly communicate it in a convenient form.

To choose an appropriate type of machine learning algorithm we have to practically evaluate: a) given issue (problem attributes), b) type of information: driven by event (sales, inventory, transactions), by data (text documents, voice messages, client profiles) or by the continuous informational input (game playing ai, driving a car), c) quality of information that we are presented with – only after that it is possible to narrow our focus to a family of problem solving methods.

| | Supervised learning | Unsupervised learning | Reinforcement learning |
|-----------------|--|--|--|
| Goal | Estimate results for new entries based on pre-determined data | Estimate results for any entries based only on raw data | Real-time analytics based on pre-trained neural net |
| Approach | Requires data preprocessing, pre-labelled data. After it was designed boosts the solution of complex problems such as: Resource Allocation, Demand, Behavior, Price prediction; Most widely used efficient tool for Marketing-Mix Analytics. | Requires data preprocessing (text, images), does not require labeling data. Designed to recognize patterns, outliers, assess distribution measures: exploratory-descriptive analytical tool. Useful for: Segmentation, Clustering, Anomaly Detection | Requires most sophisticated data preprocessing, labelling is required. Useful for industrial automation, real-time data processing for image-video detection, audio-speech recognition. Has quite specific design, not very popular for analytics. |
| Limit | Overfitting, data quality, size dependent for performance | Quite difficult to extract insights, requires a lot of data | Markovian assumption, single/multi agent scenarios |
| Tools | Regression, Classification, Conjoint Analysis, Naive Bayes | Clustering, Anomaly detection, Dimension Reduction | Markov decision process, Monte-Carlo methods, Temporal difference methods |

Table 2: Machine learning types (M.Swamynathan, 2017)

As described in the Table 2, machine learning can be divided in three main categories: unsupervised, supervised and continuous learning. Commercial marketing industry is mostly focused on the first two types, as they do not require specialized equipment to perform and have much more straightforward problem application. Supervised learning requires a teacher, who provides an algorithm with correct classification pattern from which it learns later on, teacher will be able to specify recommendations functions by providing learning material. While unsupervised learning is concerned mainly about data given, if it is normalized, cleaned and reflects real-world patterns, machine clusters given input into segments or classifies data based on the internal feature similarity, where teacher only interprets the results at the very end. Finally, dynamic learning systems are concerned with performing analysis in real-time after exhaustive pre-training, those are usually performed to analyze objects in motion cars, faces, environments etc.

Outcome for any of those types are dependent on the issue given, results could be provided as structured report of findings discovered during the research with specified categories for the audience, industry, content and application. Moreover, they could be a part of concurrent automated system, such as target promotional campaigns, or design of loyalty offers to loyal clients in order to maximize sales, where business managers would be replaced with SMS-notification of promotion for favorite product for the client. However, in most cases, management has to effectively interpret results based on purpose, methodology, recommendation, limitations and findings within the report with flexible formatting to satisfy the needs of the target audience (i.e. visual reports that regularly update performance metrics, written report about discovering accessible segmentation technique etc.).

5 Future of Marketing Research

Marketing Research, of course, is a highly complicated task to undertake and our approximations are imperfect by default, only the combination of good strategy and Big data can deliver a solid sustainable advantage to guide the company through informational era efficiently. The need of an enterprise starts with an issue that company is facing, discovery of such problem stimulated business to come up with a general approach (framework) for change management. During the digital era marketing has quickly started to gain exclusive attention for multiple convenience traits that it possessed: market coverage, easier data collection, segmentation, experiments and

much lower costs due to the nature of advertisement. However, traditional marketing research is still heavily used to provide answers to problem that were identified along the value chain about competitors for the organization, demand for technology and marketing interaction; Tools that were designed specifically for marketing research are widely applied to compose automated systems within algorithmic marketing domain. Proper approach towards modern algorithmic marketing cannot rely only on data-informed automated decisions or solemnly on the statistical, programmatic side of marketing, it delivers a solid framework to provide both: data-informed solutions to allow discovery of external conditions for pursuing analysis (bigger picture, software, equipment, compliance) and programmatic engineering to deliver methodology to apply and derive patterns from informational context. However, to successfully perform deductive reasoning, along with communicational procedures understanding that comes from traditional marketing research is vital, which means that both data-informed and programmatic marketing only together could compose complex yet effective design to perform analytical operations. Research team along with management develops should aim to develop a strategy, where after certain brainstorming leader could propose the decision-making framework on essential KPIs/Drivers from business to track the product development, while other team members divide responsibilities and align vision for future design and research in order to deploy the technology collaboratively. Certainly, the applicational aspect of scientific marketing should be understood literally; As one of the founders of the science of cybernetics, Norbert Wiener has claimed:

“The new and real agencies of the learning machine are also literal-minded. If we program a machine for winning a war, we must think well what we mean by winning. A learning machine is programmed by experience. The only experience of a nuclear war which is not immediately catastrophic is the experience of a war game.” (1985: 176)

In our case, successful application of algorithmic marketing is widely concerned with experience of use of extensive mathematical algorithms, statistics, programming and last, but not least, industry expertise to allow computational power be the intellectual source for problem solution and creative insight delivery for the core operational process in production or services. It aims to deliver a wide range of solutions that vary from simplification for the management decision making to automated service delivery with

complex decision structure, the gradient of possible applications is enormously huge for any industry, some of the most heavily involved industries are high tech, financial services, automotive, retail and media (McKinsey, 2017). Finally, algorithmic marketing gives companies and organizations opportunity to reshape the approach of decision making for management along with integrating smarter technology for vital business operations, to understand further direction of advancements and possible milestones, it is essential to evaluate current applications (as those fields would be expanding and developing solutions on investments) and limitations, which would give a concise idea of business difficulties that could be encountered during the deployment.

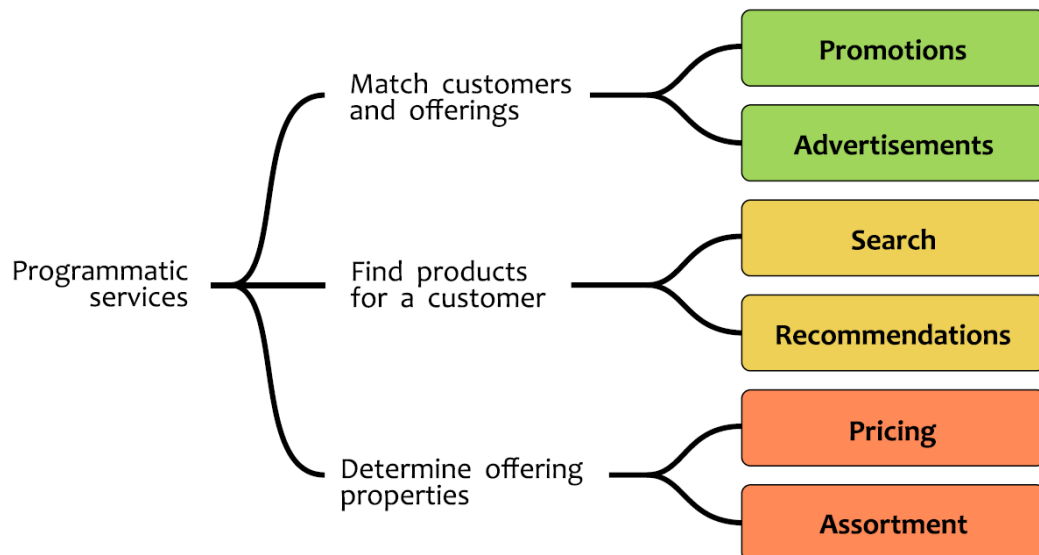
5.1 Opportunities

To elaborate on the developing possibilities for future application in the field of marketing research, this chapter will outline most widely applied solutions that came with the raise of algorithmic marketing under careful guidance of traditional approach. Big Data gained instant attention from public, gradually growing the network of professionals along with practitioners in the field, while conventional marketing research has a long-standing history of developing instruments and tools to tackle complex organizational issues with ease. The measures such as market share, stable growth for a decade, further investments and general tendency towards decision-making machinery hybridization show us very strong presence of further technological pursuit and future changes. Only this year in June we have witnessed the release of CIMON – first 3d printed floating consultant for the international space station; by the end of October the portrait of Edmond Belamy – first AI painting that eventually was sold for 432 500 dollars; skill set for Amazon Alexa speaker (dialogue, chat programmed solutions) has expanded by 19 thousands new possible interactions by the end of the year and those are the most obvious and superficial releases and changes. Marketing has consistently applied new tools to further enhance the system, while arrival of Data Science almost immediately influenced not only traditional managerial framework, but autonomous efficient and incredibly accurate tool for planning, communicating and maintaining business, which will be discussed further on.

As seen from the Figure 7, programmatic design behind algorithmic marketing has a wide variety of applications, higher management can obtain tools that allow to execute successful product promotion or even design assortment offerings to better suit

customer expectations. In the past programmatic techniques have yielded great results, as companies have been able to manage marketing budgets effectively, provide evidence-based field experiments, optimize logistics and plan product, price attributes to the intended audience with relatively better scope.

Figure 7: Programmatic services (I. Katsov, 2018)



For instance, technological progress is developing instruments to engage in proactive marketing; this year Facebook has presented technology called “Pixel” that is a small piece of code placed into web-script of internet page, it allows the owner of the website to receive wide personal information of user activities on the page (source hardware, behavior). On the, bigger scale, public has already been faced with new realities of marketing industry among them are feedback from social media, new branding concepts, applied AI content, cross selling upselling rates, customer profile and recommendation systems. Understanding such applications in the area of modern marketing along with correct problem identification is crucial for the delivery of design initiatives.

5.1.1 Operational Optimization

Machines have reached a point of autonomy, where decisions regarding sales, logistics, inventory are optimized based on the demand, supply estimations; Currently that is one of the most profitable analytical spheres, as automating the search for optimal demand satisfaction point is crucial and if it is done by machine - more precise in combinatorically intense, robust environments. Machine learning allows to define a model for predicting most demanded features, assortment based on the marketing data. Those functions

serve to ameliorate business value chain, as an example by identifying demand factors and allowing technology approximate, how changes in supply and demand may be influenced by internal product changes. For instance, “LinkedIn” developed a strategy where the content of the website (outlay, design) changes based on the user behavior (activity, preference) by implementing evaluating technology, which identifies most preferred design historically with approaching each client individually. Furthermore, promotional campaigns that are related to the business activities heavily rely on marketing nowadays: in-shop promotions, target advertisements optimization are the main activities undertaken in this domain with the help of technology. Currently, their design and planning are fully outsourced to technology: web-presence is measured through conversion rate, while in-shop campaigns are evaluated by sales metrics.

5.1.2 Customer Service

In general, the ability to track historical purchases, voice messages, shopping path, working habits, social connections on the solid basis delivers a good customer picture and allows to provide much more comforting and convenient experience to maintain fidelity, their interest and to organize user-channel around their needs. In the long term such synthesis of technology and business marketing activities will eventually provide single, reliable and reciprocal workflow, where customers’ needs would be carefully analyzed by technology and provide instant switches in case anything goes wrong. For instance, retail companies are currently developing technology for quick detection of missing products on shelves, while video content analysis allows to detect unsatisfied clients with sentiment analysis by recognizing emotions with help of face detective algorithms.

An interesting product was recently presented by “Amazon” community, it is called “GeniCan”, new gadget that is put on top of the kitchen trash bin, its goal is to provide households with fast way to shop groceries again. Basically, the idea of such device is to add products that were thrown in the trash into your shopping Amazon list, while given the capability of also classifying organic vs non-organic waste. That is a perfect example of how technology can facilitate lives of clients by facilitating customer experience along with increasing sales with the new product.

5.1.3 Routine Automation

Frequently, companies rely on the development of new technology that somehow facilitates current undertaken activities, most of profitable affairs in the company can follow a repeated structure, where technology can have a certain role of easing the life of workers. For instance, repeated actions such as bureaucratic manipulations with files, uploaded data, filled documents can be outsourced to technology and it save more time, which in turn is realized in the efficiency and more time to innovate, where employers can pursue much more relevant, competitive or even plain interesting tasks to bring value to shareholders, clients. Among habitual solutions are smart suggestions, timely purchases, data scraping, customer service, sales representative, support system, emails, voice-messages and so forth. The application of this emerged cybernetical design is widely spread in business: HR, financial reporting, invoicing, lead management moreover, document storage also has received a great deal of changes that accompany efficiency along the value chain.

On 22nd of January, "Amazon" has launched a famous fully automated working shop called "Amazon Go": no cashiers, no payments, no more waiting in queues – walk in, provide QR-code on the entrance, take your products and you are free to go. This company has been an aggressive market player for quite a while now, huge efficiency boost contributed by robotics allows effective autonomous monetization schemes and provides clients with liberty and choice by registering payments with cloud-account. This is a rather extreme case-scenario; however, it shows capabilities behind technological advancements for current era, creative solutions and the ability for companies to ameliorate services. Even though, for now we would be required to have security guards to control infringements, in general, the ability to replace humans with robust and effective technology helps not only to cut costs on salaries, but on the cost of payment systems as well. In the long-term such innovations allow cutting additional expenses and lowering the prices of goods even further, along with the ability to increase capacity of each offline store, which will eventually lead to the win-win situation for the stakeholders.

5.2 Limitations

As with any technology, starting point is to consider deep learning instruments as a Blackbox, which can be used as any instrument to deliver good and bad outcomes, therefore, to integrate such technology, firstly, the responsibility by the higher management of developing ethical dilemmas and law frameworks must be recognized. Unless conscious awareness and fully embraced responsibility comes into play, the use of such instruments can be dangerous and harming not only for shareholders' interests, but for business market as a whole, triggering social outbursts by privacy breaches may be a good representation of potential conflict and risks involved with such operations. Next step would require restructuring organization in terms of technical updates, staff and managerial personnel education, in form of instructions, guidance and regulatory conventions in order to identify issues in a quick and preserving manner, while the new corporate culture would be introduced into play. The limits set to working place should fully respond to privacy concerns along with informational safety requirements fitting "GDPR" guidelines (Global Data Protection Act). When most of the ethical, communicational risks would be evaluated the contribution of well-prepared team to perform scientific/cybernetic tasks should be formed, while management could focus on identifying the most fitting risk-return project to be undertaken, so that the strategy and product design fully respond to the needs of the customer. All of the channel and strategy costs underlying such a complex project structure should provide the space for possible value delivery, contributing to successful development and enhancement of the core business activities.

Good example of the business that has focused their operations entirely around descriptive research would be the biggest marketing company you have never heard of "ACXION", multinational data-driven powerhouse with a billion-dollar turnover (B. Marr, 2016: 103) Currently, they have been working within marketing industry for over than 50 years, the amount of collected digital data per consumer is close to 2.5 billion unique users. Their services are widely recognized by the companies like "Google", "IBM", it was mainly gathered from credit-service agencies and telecommunication companies, along with ethnographical agencies. Such a high coverage of people brings a question of security of such data, everyone leaves trails, however, how well can those trails stay within limits of "virtuous" companies?

5.2.1 Ethics

"So, big data is big, fast, and can contain a wide variety of information. It's here to stay, and it offers huge promise of economic gain, social benefit, and cultural evolution. And it's forcing ethical questions into places and environments where previously they haven't been critical to answer." (K. Davis, 2012: 12)

Key factors that have arisen in form of limitations are concerned with ethical side of big data in marketing due to high amount of data questions such as reputable personal data, security, interests and rights, ownership. As by itself information has neutral value, it can be assessed as an instrument or a tool that encompasses our needs, wants, beliefs, however, whenever this information is regarded as a resource (insights, superiority, power) it may start causing troubles from ethical perspective. Morals and principles applied to the data are closely related to posed goals and undertaken actions, valuing this information is essentially meaningless, the scope at which company or individual is ready to use it mainly is identified by the impact of risk of exposure, harm or damage for and the benefit that it may bring to both parties. Therefore, the judgement is heavily reliant on the case, state, conditions that are involved in the use of information. Identity problem with technology is one of the most popular concerns, in this regard, as technology yet cannot identify clearly the person, who is currently running the session in browser, therefore, misperceived users might receive wrong target-marketing messages or get associated with products that they have never searched. Those problems put individual at risk, which might be related not only to target web-marketing, but even to misconceived assignments of bills, data regarding health insurance or mere fraudulent financial operations have been regarded as issues for decades now.

As famously quoted by Paul Ohm: "Data can be useful or anonymous, but never both" (2010: 1702), the ability to map customer information to the individual is crucial for data analytics, as it provides statistically coherent and representative data. Moreover, security benefits most from a direct relationship between individual and his "informational representation", as it is becoming essentially harder to breach or exploit lawful pursuits for personal benefits, while every step that you are taking on the web or in real life can have a trail. It helps a lot to utilize IoT capabilities to traceback offenders, while technology and analytics are able to track inconsistencies in complex social systems in

real-time to notify authorities to either check or pursue investigations. Ethical or moral consequences of such actions are regarded to be merely virtuous, as they provide security for the general public, as well as serve as a monitoring tool to maintain peace and order in a given environment. Big data leads to a new phenomenon that is associated with the volume of it, so much concentrated information regarding the customers behavior, profile status, locations possess much higher risks in terms of security. Moreover, the problem of ownership is closely related to informational concerns, who owns the data you produce the corporation providing the service or the subject who produces it? In general, introducing such technology not only brings persistent benefits to business and individuals, but also poses risk because of the flow of greater informational stream. Modern instruments allow much quicker extraction of valuable information that can harm brand image, along with customer experience, if the actions undertaken with that data will be irresponsible, while if information has a complex structure with auxiliary elements it is much easier to map it to the real data through parsing, which put the data-based individuals under potential threat. As a great example of an ethical unwanted violation, would be quite actions taken by well-known and established company called "Netflix", they have been known to utilize machine learning algorithm to predict users interests and recommend products (movies, series), eventually they have decided to propose a price of one million dollars to somebody, who will be able to beat their current prediction accuracy by 10% or more, hence, they have shared an anonymized data of current user expectations for algorithm training and testing. Soon after, some groups of people have been able to reidentify individuals, whose rating has been presented for the competition, with publicly available ratings on the "IMDb" – therefore, indirectly, "Netflix" has exposed interests, preferences and personal details of their users, which has put them under privacy violation risk.

To sum up, marketing research and big data both rely on the presented data and the further stance on it will continue to strengthen, however, it is absolutely necessary to take concerns not only about sharing data as in the case of "Netflix", but also to establish a reliable privacy system regards for the company operations, so that cyber-attacks, or potential security violations could not lead to a massive personal data exposure, which usually brings financial or reputational harm to the essential business client base. Cybersecurity is concerned with the defense mechanism that make reidentification of users computationally impossible and thus, prevent further usage of their data.

5.2.2 Expenses

Even though, as we have already outlined Big Data provides a lot of advantages for the business, the scale, dynamics and complexity lead to essential drawbacks as with any innovational framework. Basically, most costs are concerned with maintenance of the Big Data systems, for instance, data collection is not a very stable, reliant procedure with vaults from technology, along with data representation. Furthermore, the maintenance of technology (hardware, software, integration, security) requires to pay a lot of attention in terms of time, money and personnel in order to deliver a stable workflow along the supplychain. Therefore, it is essential to consider Big Data not only as an efficient tool to facilitate human tasks and align business needs and values, but as a mere system itself that requires a lot of attention and preparation in order to function correctly and work in a given format reliably, increased agility and the ability to function faster, improved productivity also bring costs that have to be regarded with caution.

5.2.3 Compliance

Whenever the company is established it is obliged to approve its functionality, requirements with local authorities, field of analytics is no different. Not only hardware and tools require constant integration and certificate maintenance, in addition, enterprise department that is planning to work on such matters is required to integrate new application, hardware, systems into work, so that it would be productive and reliable in use, while the upper-level management is required to comply and align departments legal issues with "informational privacy law" framework and correctly applied managerial measures in order to prevent occurrence of informational misuse, uncoordinated sharing. In the light of recent events concerned with Cambridge Analytica, Facebook and other concerned cases, changes in frameworks that control Data Exchange such as GDPR (Global Data Protection Regulation) framework in EU, along with FTC (Federal Trade Commission) in U.S. introduce reasonable boundaries for companies' capabilities in the usage, sharing and coordination of information. For the department of public relations, it should be evident that understanding legal jurisdiction and regulations associated with private information would be considerable benefit, as they would be able to keep requirements in tact with those and to respond to newly introduced policies quicker. Hence, changes come not only into structural habits of the company, however, they occur on the cultural level as well, as was mentioned in the chapter about the "Design

process”, the framework should be agile and analytics is rather dynamic sphere, new ways of interpretation, scraping, applying, delivering arise each day and to keep it up-to-date, team is required to be data-driven.

6 Conclusion

Since the end of the Second World War field of cybernetics has changed beyond all recognition, fields of statistics, algorithms, programming introduce us with previously unimagined technology that facilitates lives, as well as sparks our interest. We have become addicted to technological advancement and computations with the ability to analyze, process, share, utilize information in order to predict the future or simply enjoy our favorite series. Who possibly could have imagined that what was an interest of a small group of scientists ten years ago such as unintuitive fields of Data Science, Artificial Intelligence, Cryptography, Numerical Methods or Quantum Computing, with help of technology would become accessible by practically anyone? Anyone who is ready to devote time, will be able to discover a different world with its own laws, statistics, descriptions, measurements, which function independently in the realm of information.

Programmatic field of Data Science has introduced many industries with effective solutions to pursue conjoint task achievement and operational excellence. People, companies, states rely on the data for daily revenues, stable operational workflow, further exploration and research; Technology is our guide to provide careful planning, measures and functionality in order to walk us through the complex market of today. Task automation is slowly, but steadily taking over the routine and repetitive tasks as we improve our ability to understand the working systems and underlying activity coordination. Marketing research is not an exception, with help of Big Data a field of algorithmic marketing has emerged that provided an ability to view the customer from several perspectives, depending on the multimodal inflow (semantics, psychological, behavioral), while intelligence extension in the form of target marketing and advertisement optimization makes stable income for shareholders, allowing management to focus their actions on more unintuitive matter for successful progression over the current rigorous environment of the market. It is worth mentioning that without solid theoretical background of conventional marketing research it would be almost impossible to realize value from data science in such a quick and persuasive manner.

However, field of algorithmic marketing should still be considered with a grain of salt, as of now automated systems are designed to perform preprogrammed task of classification, recommendation, recognition, monitoring, while they cannot yet create or walk beyond the scope of the training set, meaning that most of the insights (undoubtedly useful) are still reliant on the provided information. Nevertheless, they still possess the computational ability that is far reaching and encouraging without help of which we would struggle. Mass automation of customer service, sales, data warehousing logistics – data-dependent functions have become ordinary, it is not a coincidence that IoT, Technology, Big Data are admired in current society, as they became a tool for innovation and attractive decision-making, which accessible to all. However, there are still striking concerns which should be regraded with great attention such as privacy: due to recent examples of unagreed data collection, as well breaches and infringements in storing data, which led to leakages and the private collections were shared all across the internet evidently without any consent from the data-owners. Consequently, managing personal information of people can be subject to breaches not only externally (from cyberattacks), but internally as well: insider information, or queuing data collection through forbidden, exploitive channel or violations of data collection.

The answer to the threats possessed by machines, along with opportunities for now remains in the hand of the people, as the decision to exploit technology, introduce surveillance mechanisms or establish a new product optimization technique comes down to every human being individually. Amount of information that is currently being processed is unprecedented, not only defensive agencies, but regular companies and mere individuals have everything necessary at their disposal to design programs with previously unimagined capabilities that either help or harm society. Examples from companies of the initiatives such as "Amazon Go", "Alexa", "CIMON" show us that eventually our lives not only will become easier, but we will be able to use more time to pursue the goals that we want and facilitate lives for society in general. Big Data should be regarded as an instrument that can serve either good or bad, just like a hammer, it is up to states, society and individuals to decide, for what purpose will this information be used in the future. Is it going to be mass control and surveillance, or mere amelioration of experience for each other, so that finally, people will be able not only to pursue creative and meaningful jobs, but excel at something that they truly love?

References

Bostrom, Nick, (2014). *Superintelligence: Paths, Dangers, Strategies*. Ebook: Oxford University Press.

Brynjolfsson, Erik, Hitt, Loren, (2011). "Strength in Numbers: How Does Data-Driven Decision-making Affect Firm Performance?" [Online] Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1819486. [Accessed 12 December 2018].

Brynjolfsson, Erik, McAfee, Andrew, (2012). "Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy." Digital Frontier Press.

Buchanan, Bill, (2005). "A (very) brief history of artificial intelligence," *AI Magazine*, volume 26, number 4.

Bughin, Jacques, Hazan, Eric, (2017). "Artificial Intelligence the Next Digital Frontier?" Discussion Paper: McKinsey Global Institute.

Davis, Kord, (2012). "Ethics of Big Data" USA, California: O'Reilly Media, Inc.

John, McCallum; Hblok.net. 2018. "Freedom, Electronics and Tech; Historical Cost of Computer Memory and Storage" [online] Available at: <https://hblok.net/blog/storage/> [Accessed 10 March 2019]

Katsov, Ilya, (2018). "Introduction to Algorithmic Marketing." [online] Available at: <https://algorithmic-marketing.online/> [Accessed 16 March 2019]

Kotler, Philip, Wongm Veronica, Saunders, John, Armstrong, Gary, (2005) "Principles of Marketing." UK: Pearson Education Limited.

Kotler, Philip, Scheff, Joanne, (1997). "Standing Room Only: Strategies for Marketing the Performing Arts." USA: Harvard Business School Press.

Kromme, Jeroenm (2017). "Python & R vs. SPSS & SAS" [online] Available at: <https://www.r-bloggers.com/python-r-vs-spss-sas>. [Accessed 10 March 2019]

Marr, Bernard, (2016). "Big Data in practice: How 45 successful companies used Big Data Analytics to deliver extraordinary results" UK, Cornwall: TJ International Ltd

McCarthy, Jerome, (1960). "Basic Marketing. A Managerial Approach".

McKinsey&Company, (2011). "Big data: The next frontier for innovation, competition and productivity." [Online] Available at:

http://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation. [Accessed 12 December 2018]

Mooi, Erik, Sarstedt, Marko, Mooi-Reci, Irma, (2018). "Market Research" Singapore: Springer Nature Singapore Pte Ltd.

Norbert, Wiener, (1988). "The Human Use of Human Beings: Cybernetics and Society." Boston: Da Capo Press.

Norbert, Wiener, (1985). "Cybernetics or Control and Communication in the Animal and the Machine". Cambridge, Massachusetts: the M.I.T. Press

Ohm, Paul, (2010). "Broken Promises of Privacy: Responding to the Surprising Failure of Anonymization" UCLA Law Review 57

Ransbotham, Sam, Kiron, David, (2017). "Research Report Reshaping Business with Artificial Intelligence." MITSloan Management Review. [Online] Available at:

<http://marketing.mitsmr.com/offers/AI2017/59181-MITSMR-BCG-Report-2017.pdf>. [Accessed 13 December 2018].

Richards, Neil, (2014). "Big Data Ethics." Washington University: Wake Forest Law Review, [Online] Available at: <https://ssrn.com/abstract=2384174> [Accessed 12 December 2018].

Rumelt, Richard, (2014). "Good Strategy, Bad Strategy." Russia, Moscow: Mann, Ivanov and Ferber press.

Sathi, Arvind, (2014). "Engaging Customers Using Big Data: How Marketing Analytics Are Transforming Business." USA, New York: St. Martin's Press.

Sherry, Tiao, (2018). "GDPR and Big Data: 4 Steps to Compliance." [ONLINE] Available at: <https://blogs.oracle.com/bigdata/gdpr-big-data-steps>. [Accessed 12 December 2018].

Sponder, Marshall, (2012). "Social Media Analytics: Effective Tools for Building, Interpreting, and Using Metrics." USA: The McGraw-Hill Companies.

Stackowiak, Robert, Licht, Art, Mantha, Venu, Nagode, Louis, (2015). "Big Data and the Internet of Things" USA, New-York: Springer Science and Business Media Finance.

Statista, 2018. "Revenue from big data and business analytics worldwide from 2015 to 2022 (in billion U.S. dollars)." [ONLINE] Available at: <https://www.statista.com/statistics/551501/worldwide-big-data-business-analytics-revenue/>. [Accessed 13 December 2018].

The Economist, (2017). "The world's most valuable resource is no longer oil, but data." [ONLINE] Available at: <https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data>. [Accessed 12 December 2018].

Thompson, Arthur, (1998). "Crafting and Implementing Strategy." Russia, Moscow: Unity Press.

Venkatesan, Rajkumar, Farris, Paul, (2014). "Cutting Edge Marketing Analytics." USA: Pearson Education Inc.