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Values of artificial intelligence in marketing

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ABSTRACT

Artificial Intelligence (AI) is causing radical changes in marketing and emerging as a competent assistant supporting all areas of the marketing field. The influences and impacts AI has created in various marketing segments have aroused much interest among marketing professionals and academic scholars. Comprehensive and systematic studies on the values of AI in marketing, however, are still lacking and the existing literature fragmented. This research provides a comprehensive review of the existing literature in the relevant fields as well as a series of systematic interviews using the Value-Focused Thinking approach to understand the values of AI in marketing. This research results in a means-ends network demonstrating the values and the relationships between the articulated values of AI in marketing by the subjects.

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1. INTRODUCTION

Artificial Intelligence (AI), a subset of the fourth Industrial Revolution, which has been under heated discussion for a long while, is playing an increasingly important role and serving as a competent assistant in nearly all industries. AI will (if not already) exert considerable impact on the interaction and interconnection within organizations and provide new decision-making methods based on big data and analytics. Innovative products and services through the use of AI technologies, huge productivity improvements, and intensified global competition are expected (Makridakis, 2017).

In the field of marketing, Artificial Intelligence also demonstrated its usefulness and transformative impact. American Marketing Association defined marketing as "the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have values for customers, clients, partners, and society at large"(AMA, 2017). AI has deeply impacted the marketing companies and sales units, causing revolutionary changes in the field (Yang & Siau, 2018).

It's of great significance to dig deeper into the values that AI generated in marketing segment, since it has already shown up and taken root in every corner of the business market. For example, AI can help to segment customers by assisting to collect customers' data, managing and analyzing data in real-time, and offering personalized and customized service and goods based on the customer segmentation (Yang & Siau, 2018). Many existing AI tools can help to enhance advertising and promotion procedures by automatically offering customized e-mails, practical flyers, and social media ads to potential customers (Cooper, 2019). AI is also capable of enhancing organization

management and market operations through its complex algorithms and large data to precisely analyze complicated business and finance data to assist business decisions and predict price fluctuation (Milgrom & Tadelis, 2018). Further, AI can contribute to the procedures of delivery and payment by offering advanced routing systems that study the traffic situations in real-time and monitoring order systems 24/7 to prevent fraud (Putri, 2018).

The impact of AI on marketing can also be viewed from the investment. $2.5 billion U.S. dollars was invested in AI marketing companies in 2018 (MTS, 2019) and $1 billion in the second quarter of 2019 alone. Worldwide, $11 billion has been invested in AI marketing companies since 2014 (Martin & Writer, 2019).

In this paper, we used Keeney's Value-focused Thinking (VFT) approach to capture the values of AI in Marketing. The means-ends objective network, which distinguishes between fundamental objectives and means objectives, derives from the Value-Focused Thinking approach will be presented in this paper (Keeney, 1992). The network shows the values of marketing segment facilitated by AI as well as the relationships and interactions among these values. Therefore, we're able to come to a conclusion that what are the main implications of AI in marketing that can facilitate achieving company strategies.

2. LITERATURE REVIEW

2.1. ARTIFICIAL INTELLIGENCE, BIGDATA, AND MACHINE LEARNING

The widespread emergence of AI is coming and occupying as a new round of revolution, bringing greater living standard improvement, huger productivity enhancements, and further wealth expansion, compared to any other former revolutions (Makridakis, 2017). Big data, machine learning, and powerful solutions serve as core elements of AI marketing, which have facilitated forming its prosperous and powerful status (Tjepkema, 2019). AI can be regarded as a machine that pretends to be a human, learning by looking at human (Morgan, 2017), whereas machine learning is the ability of learning to fulfill tasks as human, by means of programming as statistical programmers (Sterne, 2017). Big data, focusing on the volume, variety, and velocity of data generated, is the source that used to train machines to learn and formulate correct machine learning models. In conclusion, “AI is an application of machine learning”, and big data analysis is the foundation and prerequisite of AI and machine learning (Chandra, 2019, p.23).

2.2. DIMENSIONS OF AI IN MARKETING

When AI is applied to the marketing unit, it will exert a variety of influences to the marketing segment. We found 38 useful articles that talks about the values, functions, influences, impacts, or advantages of AI in marketing, or one application (or several applications) of AI in certain market segments (or one marketing segment). The prior literature that introduces the impacts or values of AI in marketing can be generally classified into eight dimensions as following according to the functions of marketing

(Weld, 1917; “7 Functions of marketing,” 2019; Yang & Siau, 2018; Jarek & Mazurek, 2019).

The framework we used to make the classification of values of AI in marketing is derived based on an extensive literature review of the main marketing functions, which combines and syntheses of Weld’s opinion of seven marketing functions, “7 Functions of marketing” in Quizlet.com, and Yang and Siau’s work of “A Qualitative Research on Marketing and Sales in the Artificial Age”(Weld, 1917; “7 Functions of marketing,” 2019; Yang & Siau, 2018). Eight main marketing functions that are introduced in previous literatures as well as the ones in this paper are show in Table 2.1.

Table 2.1 Eight Main Marketing Functions

Weld, 1917	**“7 Functions of Marketing”, 2019**	**Eight Main Marketing Functions**
Assembling		
Storing	Product/Service Management	Customer Service Management
Assumption of Risks	Marketing Information Management	Marketing Information Management
Financing	Financing	Financing
Rearrangement		Marketing Operations
Selling	Selling	Selling
Transportation	Distribution	Transportation
	Pricing	Pricing and Product Management
	Promotion	Promotion

Based on the literature review, there are eight main marketing functions: customer service management, marketing information management, financing, marketing operations, selling, transportation, pricing, and product management, and promotion (Weld, 1917; Yang & Siau, 2018). The definition of marketing and the eight main marketing functions were presented to the subjects in this study. We methodically classified the values generated from both reviewing of the existing literatures and the interview results, into the eight categories based on the classifying framework. Then we can take advantage of the classification to generate the means-ends objective network more efficiently and reasonably.

2.2.1. Promotion. The AI-powered conversion optimization tools show competent in attracting potential consumers and speed up business conversion (Miikkulainen, Iscoe, Shagrin, Rapp, Nazari, McGrath, Schoolland, Achkar, Brundage, Miller, Epstein, & Lamba, 2018), because of its function that can capture consumers' preference in certain goods and then offers promotion information or other similar recommended products to them. For instance, AI is competent in scoring the advertising images based on the click rate of them and automatically selecting the images used to facilitate brand awareness or promote consumption (Gijs, Manuel, Rand, & Weishampel, 2019).

Besides, based on the analyzing of consumer behavior, personalized and customized promoting and advertising campaign will be send to particular customers automatically through email, mail, or social media (Turban, Outland, King, Lee, Liang, & Turban, 2018). Further, companies are capable of predicting consumer behavior and deciding the offering type and time (Turban et al., 2018).

2.2.2. Marketing Information Management. AI systems expertize in collecting, crunching, and analyzing large volumes of customer data from all available sources and then extracting useful information from the massive database (Sterne, 2017; Duran, 2016; Wayshak, 2018). Under the facilitation of AI, the process of collecting and analyzing data will be more effective and efficiency, and the commitment of understanding its customers' interests and requirements for a business will be easier and more accurate.

2.2.3. Customer Service Management. Apart from advertising and marketing information management, customer service management is also a main field that AI has impressed impact on the marketing section. Besides, AI also favors studying consumer behavior through the customers' data analysis and therefore offering personalized and customized services and products (Turban et al., 2018; Vieria & Sehgal, 2017; Faggella, 2019). The offers consist of both automatic recommendations and relevant product suggestions (Grewal, Roggeveena, & Nordfaltba).

In addition, AI, utilizing certain supervised machine learning models, has already shown capability on providing valuable insights and advices for elicitation and monitoring consumer requirements (Kühl, Mühlthaler, & Goutier, 2019). Chat bots are widely utilized in consulting and after-sale service (Rozga, 2018; Machiraju & Modi, 2017), which have made 24/7 customer service become a reality (Jarek & Mazurek, 2019). Other than that, robocall is generally used for gathering customer feedback and sale promotion.

Moreover, social media platform is nowadays an extremely important channel, which can't be underestimated, for firms to directly engage with customers (Rohm,

Kaltcheva, & Milne, 2013). It's of great significance for AI to prioritize customers' concerns and effectively decide to which to be responded since it's impossible unnecessary to respond to every single customer comment (Gijs et al., 2019).

2.2.4. Marketing Decision-making. AI is of great significance in improving and supporting decision-making by recommending strategies generated by intelligent systems. These decisions include the how to choose and conduct the selling procedure, which distribution channels to select, whether and when to rearrange the materials or commodities, and what should be the sales prices and profit margins (Weld, 1917).

Firstly, AI can help develop a model that can simulate professional trading agents' decision-making process (Moreno, 2009), which will contribute to the rationality and validity of the machine-learning models. Secondly, a hybrid intelligence system is also favorable for developing accurate and appropriate marketing strategies (Li, 2000), combining machine-based analysis with the judgment and creativity of human. The AI based decision-making systems may aid in leveling up the speed of strategy development, increasing the confidence in strategy-making, enhancing the quality and quantity of decision-making, raising the degree of accuracy and preciseness of decision (Li, 2007; Li and Li, 2009). Besides, it can also help make more consistent decisions by means of analyzing the objective circumstance in the industry and the in-charged resources and scheduling the production missions in the most efficient way (Metaxiotis, Psarras, & Askounis, 2002).

2.2.5. Marketing Operations. Since AI is causing radical changes in marketing, organizations therefore need to develop and improve themselves to adapt to the new environment and digital systems in marketing. AI website builder, such as Firedrop, the

Grid, and Wix ADI, is considered as a favorable method to enhance organizational management (Rancea, 2019). AI website builder enables an easier and more efficient way to design effective web interfaces, by using chatbots, AI-powered search engine optimization, and other AI tools in web design (Bharat, 2017).

Besides, AI enhances the managers' creativity and enables firms to allocate more time to develop creative offerings (Kumar et al., 2019) by taking over the troublesome and repetitive work. Some AI applications such as robots and automated factories are good examples of how AI can take over the time-consuming and boring jobs and earn human more time for creative and innovative work.

Further, AI is capable of optimizing operation processes by designing many kinds of new marketing processes that fit to different situations it predicted, and implementing the specific operation process automatically and dynamically.

Lastly, voice, text, and image processing technologies are widely used in marketing to facilitate knowledge representation, reasoning, planning, and executing, at an amazing scale and speed left human far behind (Wirth, 2018). The AI approach that is prosperous recently called natural language processing (NLP) is replacing manual searches and understanding human actions (Dutton, 2018; McGregor & Whicker, 2018).

2.2.6. Pricing and Product Management. AI can automatically and more accurately measuring market performance and products demand, on the basis of that, AI can predict the price fluctuations of different products or service (Milgrom & Tadelis, 2018). Besides, AI is also capable of analyzing and forecasting the market growth, and therefore predicting the future demands (Burgess, 2017). Therefore, it's easier for a company to set the price of a product at the appropriate and acceptable level, which is

automatically changed under the instruction of AI based on its aggregate analysis, and provide it at a reasonable and profitable quantity.

2.2.7. Financing and Securing Transaction. Financing, which has the functions of gaining sufficient funds, budgeting for marketing activities, and facilitating check out and payment procedure ("7 Functions of marketing," 2019), is already become a field that AI has shown its promising capabilities.

AI has offered a variety of financial assistance to consumers in order to enhance the security and convenience of the checkout and payment procedure. Since AI is able to mimic human cognitive abilities of studying and solving problems, it's also able to detect, prevent, or overcome fraud and cyber attack in the payment procedure on the basis of the big data analyzing (Dutt, Contributor, & CSO, 2018; Putri, 2018; Clark, 2017). Since an increasing number of cyber attacks are powered by AI, it's vital for AI-powered fraud-combating systems to continuously adapt to market requirements, consistently update customers' identifiable data, and generate personalized user models of payment authentication to make sure it's their customer rather than an attacker (Dutt et al., 2018).

Along with the improvement of the security of payment, AI is also conductive to the convenience and efficiency of payment thanks to the automatic payments brought by AI based improved processes (Jarek & Mazurek, 2019). The subscribing function, auto replenishment, and the auto saved paying methods information are all representations of the automatic payments.

2.2.8. Transportation. Transportation and delivery is also an indispensable sphere of marketing strongly influenced by AI, which will ensure the whole consumption procedure completed smoothly. If isn't taken much care of, it may tear up all the efforts

made in basic marketing activities. Refrigerated delivery vehicles have been put into use for decades, yet under the AI revolution the latest delivery vehicles are equipped with automatic air temperature monitoring equipment and intelligent sensor structures (Shan, Liu, Prosser, & Brown, 2004). Besides, the concept of AI-powered temperature recorders and sensors that are able to diagnose malfunctions, identify status, and monitor operation online has already been brought forth by scientists and researchers (Shan et al., 2004).

Moreover, increasing numbers of firms use AI to accomplish the optimized and automated delivery (Kumar, Bharath, Rajkumar, & Jim, 2019). For example, Uber Eats use AI to take all main factors into consideration, such as the predicted preparing time of dishes, the time for driver to pick up, the time for delivery from restaurant to customer, and the availability of drivers, in order to optimize delivery times (Williams, 2018).

The prior literatures are only some fragments of the impact of AI in marketing field that are incomplete or lag behind the latest circumstance. There is a lack of research that analyze the up-to-date, overall, and comprehensive values and impacts of AI in marketing. Besides, the existing literatures mostly only discussed about what are the impacts of AI rather than how does AI make the influences. In this paper, we're going to talk about what are the main values AI brings forward in marketing as well as how are the values generated.

3. RESEARCH METHODOLOGY

3.1. VALUE-FOCUSED THINKING

"Values are principles for evaluating the desirability of any possible alternatives or consequences". Values define all that you care about in a specific decision situation" (Keeney, 1994, p. 2). Values can be derived by collecting and analyzing the functions, advantages, positive influences and impacts or any other relevant features or effects of AI in marketing. In other words, these functions, influences, impacts or advantages are fundamentally important in any decision situation (Keeney, 1994).

VFT is an approach to help uncover concealed or imperceptible objectives (Keeney, 1994), and systematically organize them into a network that demonstrates their importance and interrelationships (Keeney, 1992). VFT aims to define and classify the means objectives, the fundamental objectives (i.e, strategic objectives), and the overall objective, and use these different stages of objectives to direct decision-making (Keeney, 1994). Using VFT will help the decision-makers to generate more reasonable, appealing, and effective decision alternatives rather than just limiting to the ones that confront them. The approach identifies decision-makers' overall objective and discloses "what" is important and "how" to achieve it (Keeney, 1992).

The need to identify values has long been treasured and taken seriously. In pursuing excellence in management, a piece of all-purpose advice is to figure out the "value system" (Peters & Waterman, 1982). Nearly all organizations have developed their goals, missions, or strategies. However, they are almost all stated in a general and vague way, such as creating a better working environment for employees, improving

productivity, and enhancing innovation and development. Therefore, values need to be made explicit and the best way to accomplish it is converting them to the definition of objectives because objectives articulate one's desirable state that one wants to achieve.

The steps of VFT are as follows (as shown in Figure 3.1):

(1) Identify all possible values.

To identify the values of AI in marketing, we collect information through interviews based on VFT. Through the interviews, we are able to collect different subjects' opinions on the values of AI in marketing and generate an initial list of all the possible values. The research is ongoing and we will keep interviewing until the saturation point is reached (i.e., new objectives stop showing up). There are some techniques that we are using in this step, for instance, developing a wish list, identifying all kinds of alternatives (both good ones and terrible ones), considering problems and shortcomings that need to be fixed in the current situation, predicting consequences, and identifying goals, constraints, and guidelines (Keeney, 1994).

(2) Convert values into a common form of objectives.

After generating a list of values, we need to convert each of these values into a common form, an objective. Values can be clarified and made explicit through the process of identifying objectives since fundamental objectives are clear and straightforward statements about what one wants to achieve (Nah, Siau, & Sheng, 2005).

(3) Structuring objectives – Distinguish between fundamental objectives and means objectives.

In this step, we need to structure the objectives we generated, classifying them into two lists: means objectives and fundamental objectives. Using the means-ends logic,

we can identify some general objectives as “ends”, and then put the specific ones, regarded as “means”, under the corresponding “end“ (Keeney, 1994). By the same token, fundamental objectives are “end-benefits” objectives, which represent the “ends”, “strategic objectives”, or “fundamental values”, that the decision-makers value. Means objectives serve as the methods that contribute to the ends (Keeney, 1992; Keeney, 1999).

(4) Build means-ends objective network.

Finally, we gather all the objectives together and develop the means-ends objective network systematically and iteratively. The network shows the interrelationship among all the objectives, using arrows to connect them. An arrow from one objective to another depicts that the achievement of the former objective will largely promote or is a means of achieving the latter one (Keeney, 1994). In other words, an arrow is drawn from the cause objective to the effect objective.

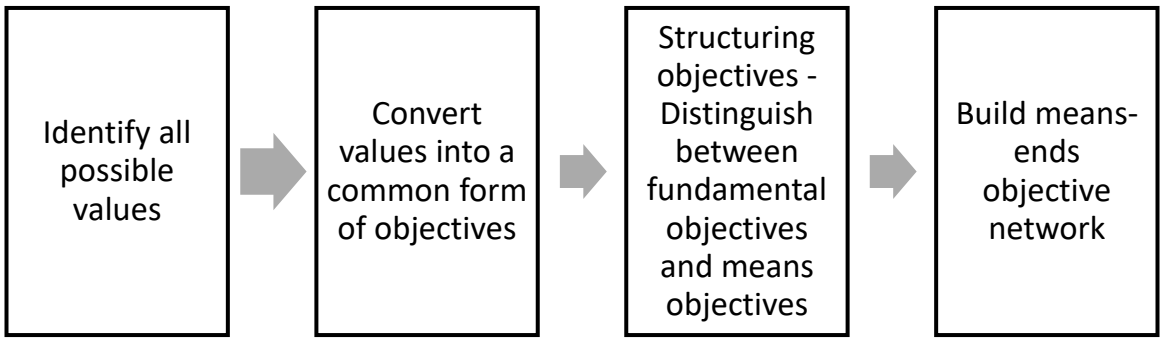

Figure 3.1 Steps Involved in Value-Focused Thinking Approach

3.2. PROMPTING QUESTIONS

Following the steps of VFT approach, we’ll conduct our interview follow the interview questions such as (Sheng, Siau & Nah, 2010):

1. What do you think are the benefits of using AI in marketing?
2. Why are they important?
3. What problems or concerns may arise in using AI in marketing?
4. What are the important factors that affect the values of AI in marketing?
5. What are the functions or features of AI you wish to have in marketing without consideration of limitation?
6. How to achieve them?

3.3. DATA ANALYSIS

After the interviews were conducted, we gathered values of AI in marketing from the interview transcripts. Based on the values derived from interview transcripts, we identified an initial list of objectives, which is an objective pool for further selecting and analyzing. Then we converted the values we collected into a common form of objectives, each of which is composed of a decision context (i.e. maximize, minimize, or enable), an object, and a direction of preference (Sheng et al., 2010). After this process, we pick out the repeated or redundant objectives, and come to a final objective list comprised of five fundamental objectives and 33 means objectives (as shown in Table 1).

Further, the cause-effect relations between the objectives were identified by the interviewees' answers to the question "Why are they important?" This process will make the interviewees think thoroughly and critically about the relationships between the objectives they've stated. When the answer shows like "It's important for no reason" or "It's important because itself is important", then we can deduct this objective is a

fundamental objective. Otherwise, when there are some reasons for its importance, it can be regarded as a means objective.

For example, one of the interviewees answered, “I appreciate the recommendation function that AI offers in shopping websites such as Amazon, it can always give me some recommendations based on my browse history, purchase history, the items in my shopping cart, and the items I saved for later” in the first question. Then the researcher asked the interviewee “Why do you think it’s important?” The answer of the interviewee went as “Because it’s a really useful function which is to my convenience, for it can give me some recommendations that based on my personal preference, which is different from person to person, and I think it can also improve the efficiency in advertising.” Again, the researcher followed up with “Why are they important?” And the participant answered, “It can help the enterprises sell more products, which means more effective and efficient in marketing, and make more profits by giving more targeted and appropriate recommendations. But I can’t tell the reason why the convenience is important, for the reason that convenience itself is important. ” The we can see the means-ends chain of the example is shown as: “Enable personalized recommendations” > “Maximize efficiency in advertising”, “Maximize one-to-one marketing” > “Maximize business profit”, “Maximize effectiveness of marketing”, “maximize efficiency of marketing”, “Maximize convenience of customers”.

In this section, we combined the values derived from the interviews as well as from the literature reviews, to make the research results more comprehensive and reasonable. We excluded the values that were only mentioned by no more than two participants to ensure the objectives we derived are primary, important, and common.

3.4. SAMPLING AND NATURE OF SUBJECTS

The sampling we carried out in this research is convenience sampling, which is aimed at interviewing the students and other adults at Missouri University of Science and Technology (Missouri S&T) as well as some marketing or AI professionals in the US. We selected the subjects who age 19 or older, with the gender of female, male, and others. Besides, we expected to interview no more than 80 students from Missouri S&T and adults as our subjects in this research. Since the quantity of subjects depends on if we have already find out almost all of the possible values of AI in marketing, which means nearly no more new values begin to show off and the answered become repeated as the former ones, we finally interviewed 40 subjects in total (eight in pilot study and 32 in field survey).

3.5. JUSTIFICATIONS OF RELIABILITY AND VALIDITY

Since this research collects data almost only from Missouri S&T, the research results will show relatively high external validity and, in turn, relatively low internal validity. Because the research results generate only from one college, it doesn't show enough causality between dependent variables and independent variables. However, it shows high generalizability, which means the research results are of high possibility to be generalized to other associations or population. Therefore, in order to improve the internal validity, we'll try our best to interview more subjects as we can, under the reasonable and achievable situation.

4. RESEARCH PROCEDURE

4.1. PILOT STUDY

We collected text data from eight subjects in the pilot study phase by eight one-to-one interviews. We've learned that we need to ensure the interviewees know what exactly is AI, what are its common applications, what exactly is marketing, and what are the main domains of marketing. Besides, we're supposed to make sure the interviewees' answers are always accord with the theme and never stray from the point.

The preliminary findings of the pilot study are shown in Figure 4.1.

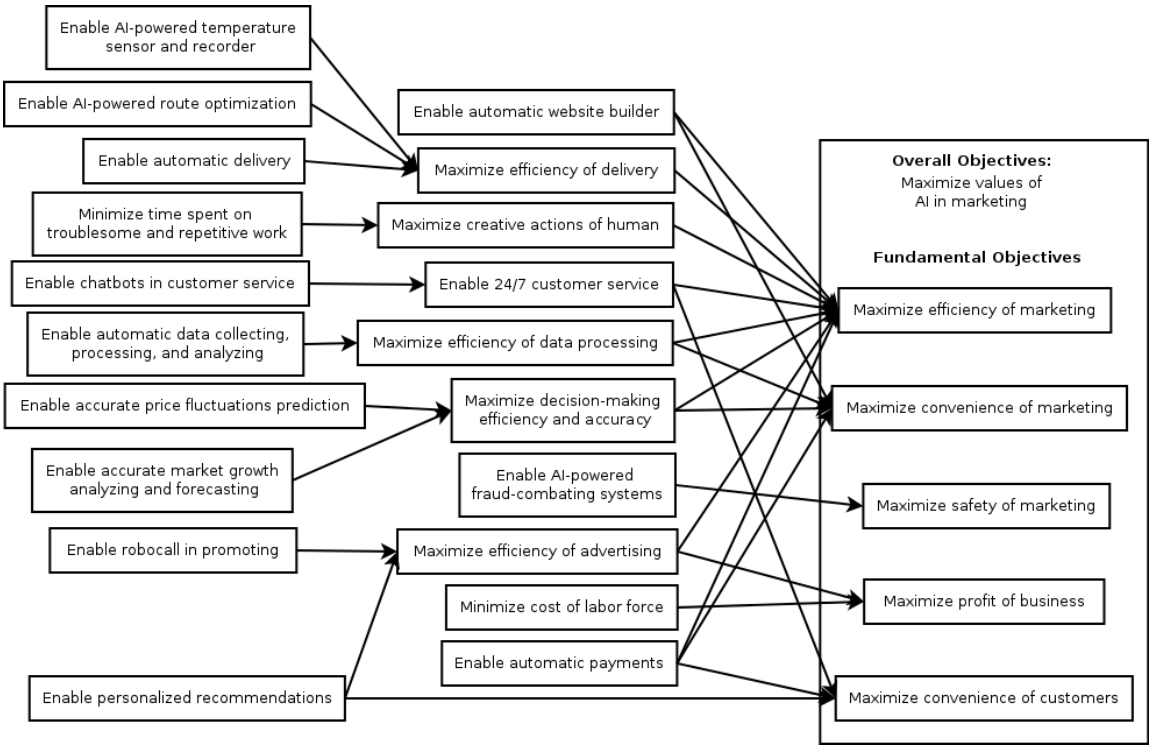

Figure 4.1 Preliminary Means-ends Objective Network

4.2. FIELD SURVEY

After doing the pilot study, we have made up for the mistakes and deficiencies found in the interview procedure of pilot study. Reconsidering the problems and dilemmas in the pilot study, we've made some adjustments as following. Firstly, we intend to clearly state the definition of AI and marketing as well as point out common applications of AI and main domains of marketing before interviewing. After that, we're going to remind the interviewees to focus on "values of AI in marketing" whenever they digress the point.

We conducted the field surveys in a major university in the Midwest, which is known as Missouri University of Science and Technology, to find out the means-ends objectives of AI in marketing. Based on the convenient sampling, we conducted interviews with 32 subjects, 20 of whom are subjects form Missouri S&T including students who are 19 or older and other adults, the other 12 of whom are marketing or AI professionals from all over the United States.

5. RESEARCH RESULTS AND DISCUSSION

The means and fundamental objectives we obtained from this research are shown in Table 5.1. Besides, the cause-effect relationships between means objectives and between means and fundamental objectives are shown in the means-ends objective network (see Figure 5.1).

Table 5.1 Fundamental Objectives and Means Objectives Table

Overall Objective: Maximize Values of AI in Marketing	
Fundamental Objectives:	
Maximize efficiency of marketing *Example:* Enable automatic replenishment of stock Enable producing higher quality products in a higher speed **Maximize business profit** *Example:* Produce more products than human in the same time Minimize the cost of labor force **Maximize effectiveness of marketing** *Example:* Enable one-to-one advertising Maximize usability of customer data	**Maximize reliability, security, and privacy of marketing** *Example:* Enable automatic payments under the protection of financial safety net Minimize information leak or mistakes caused by human **Maximize convenience of customers** *Example: Enable* personalized advertising and customer service Enable big data and AI

Table 5.1 Fundamental Objectives and Means Objectives Table (cont.)

Means Objectives:	
Enable robocall in promotion *Example:* Use robocall to spread sale or discount information to subscribers	based products comparing and selecting functions
Enable personalized recommendation *Example:* Offer recommendations based on purchase history, the items been clicked on, and demographic information	**Enable AI-powered route optimization** *Example:* Find the best route based on current traffic condition Avoid roads that are crowed, under construction, affected by traffic accident or bad weather
Enable automatic data collection, processing, and analysis *Example:* Enable accurate price fluctuations prediction Enable accurate market growth analyzing and forecasting	**Enable robot/drone delivery** *Example:* Use robots or drones to deliver packages rather than traditional delivery driver/courier
Enable chatbots in customer service *Example:* Enable immediate reply of common questions Don’t need to waste time to wait in line for customer service staff	**Maximize efficiency in advertising** *Example:* Enable advertisements based on gender, age, social status, and previous cater **Maximize one-to-one marketing** *Example:* Enable personalized online

Table 5.1 Fundamental Objectives and Means Objectives Table (cont.)

Enable products comparison *Example:* Help customers compare and select the most favorable item based on comprehensive measuring of different factors and prices	shopping interfaces based on personal preferences
Enable automatic notification of price variation *Example:* Send notifications to customers about the recent price decrease of the items they may like	**Enable AI-powered fraud-combating systems** *Example:* Use AI to detect, prevent, or overcome fraud and cyber attack in the payment procedure Enable updating customers' identifiable data consistently and generating personalized user models of payment authentication
Enable AI based decision-making systems *Example:* Enable marketing models that can simulate professional trading agents' decision-making process Use machine-based analysis to generate accurate and appropriate marketing strategies	**Maximize efficiency and accuracy of data processing** *Example:* Use algorithms to build a data processing system Computers can do the arithmetic swiftly and accurately
Enable automatic manufacturing, assembling, and packaging	**Maximize customer service** *Example:* Enable 24/7 customer

Table 5.1 Fundamental Objectives and Means Objectives Table (cont.)

Example: Use mechanical arms or robots in manufacturing, assembling, and packaging	service Maximize efficiency of communication
Minimize time spent on troublesome and repetitive work	**Maximize decision-making efficiency and accuracy**
Example: Use mechanical arms or robots to do repeating or time-consuming work Use AI in mass production rather than human	*Example:* Recommend marketing strategies generated by intelligent systems Enable consistent and flexible decisions based on current circumstance and resources
Minimize danger to human	**Minimize cheating, bias, mistakes, or malicious behavior**
Example: Use AI to do dangerous work Minimize the danger to human caused by carelessness or tiredness by using AI to do the repeating or tiring work	*Example:* Minimize cheating or malicious behavior caused by betrayers or commercial spies Minimize bias or mistakes caused by human
Enable automatic website builder	**Minimize cost of production**
Example: Use AI website builder to build a website that will automatically vary based on different situation	*Example:* Minimize cost of labor
Enable natural language processing and image processing	

Table 5.1 Fundamental Objectives and Means Objectives Table (cont.)

Example: Enable calling and messaging hands-free Virtual assistant AI, such as Amazon Alexa, enables users intuitively interacting with (i.e. talk to) the devices that are available to it	force Minimize the loss of imperfections
Enable automatic demand recording and prediction	**Maximize productivity of business**
Example: AI helps record demands and automatically build a database Enable prediction of future demands and forecast of the market growth	*Example:* Machines' production efficiency is much higher than human The functions such as automatically purchase and AI communication largely enhance the productivity of business
Enable automatic replenishment	**Maximize creativity and innovation**
Example: Enable automatic record of stock, show the variation of stock and which item needs replenishment Send buying information to suppliers and make purchase automatically according to the stocking system	*Example:* Take over the time-consuming and troublesome work to leave people more time to do the creative and innovative work Try different combinations of possibilities and make some breakthrough beyond human's thinking forms

Table 5.1 Fundamental Objectives and Means Objectives Table (cont.)

Enable flexible pricing *Example:* Enable flexible pricing based on the number of clicks and times of purchase Increase the price on holidays or weekends, sales increase largely, or times of clicks increase dramatically	**Maximize efficiency of operation** *Example:* Optimize operation processes by designing many kinds of new marketing processes that fit to different situations it predicted
Enable automatic payments *Example:* Enable subscribe function which can automatically make a purchase and do the payment periodically Enable automatic payments on trustful websites or apps in which payment methods have already been saved	**Maximize confidentiality of data** *Example:* Use machines to collect and analyze customer information to minimize information leak Enable automatic payments completed by machine rather than human to minimize credit card information leak
Enable AI-powered temperature optimization in delivery trucks *Example:* Enable automatic air temperature monitoring equipment and intelligent	**Maximize efficiency of product management** *Example:* Enable monitoring the stock status and the quantity of sale freely and clearly

Table 5.1 Fundamental Objectives and Means Objectives Table (cont.)

sensor structures on delivery vehicles AI-powered temperature recorders and sensors enables diagnosing malfunctions, identifying status, and monitoring operation online	Automatically replenish based on stock status and decide the replenishment quantity based on recent quantity of sale **Maximize efficiency of delivery** *Example:* Enable automatic sending and delivery cupboard Enable AI optimized delivery route

5.1. OVERALL OBJECTIVE AND FUNDAMENTAL OBJECTIVES

The overall objective for AI in marketing is to maximize values of AI in marketing. And the five fundamental objectives, which are considered of greater significance to studying the values of AI in marketing, are “maximize reliability, security, and privacy of marketing”, “maximize business profit”, “maximize effectiveness of marketing”, “maximize efficiency of marketing”, “maximize convenience of customers”.

5.1.1. Maximize Reliability, Security, and Privacy of Marketing. As was stated by the subjects, it is regarded as one of the primary benefits of using AI in marketing segment. Since AI enables automatic collecting, crunching, processing, and analyzing of data, it can largely reduce the possibility of mistakes or negligence of human, improving the accuracy significantly. Besides, it can also prevent the phenomena

of prejudiced attitude or disloyal behaviors of human, which may cause wrong judgments, information leak, or systems broken-down. In terms of this, adopting AI in marketing will also enhance the security and privacy of marketing.

5.1.2. Maximize Business Profit. Maximize Business Profit is also a main value of applying AI to marketing field. As profit is generally accepted as a decisive factor in business, being capable of augmenting business profit makes AI more and more popularized in almost all industries, especially in marketing segment. What AI can do is significantly cutting the cost and increasing the sales volume, which will result in boosting profits. From the perspective of cutting the cost, adopting mechanical arms or robots to do the manufacturing, assembling, and packaging work will largely lower the rate of defective products and increase productivity; letting AI take over not only the simple and time-consuming work but also some executive post such as decision-making positions will immensely cut the cost of labor force. In the terms of increasing the sales volume, AI has the functions of personalized recommendations, one-to-one marketing, and some latest and efficient promoting channels such as robocall. These personal interests targeted functions will cater to customers' tastes to the utmost and thus greatly level up the sales.

5.1.3. Maximize Effectiveness of Marketing. Maximize Effectiveness of Marketing, known as another fundamental objective of AI in marketing, is demonstrated in the following points of view. Firstly, personalized recommendations and one-to-one marketing will reduce failing transactions and invalid promotions, which will enhance the effectiveness of advertising and, afterwards, marketing. Secondly, AI-based automatic website builder, which will change content and layout due to specific user concerns, and

AI-based flexible pricing function, which will price the items based on click rate, page view, and many other external factors such as holidays and weather, will also help improve the effectiveness of marketing. Further, AI-based data collecting, crunching, and analyzing function assists in getting valid data and information as well as come to more effective and accurate results. Lastly, AI-based decision-making systems are able to not only come up with more effective and consistent decision-making strategies, on the basis of the circumstances of the industry and the in-charged resources, but also schedule and implement them in the most efficient way (Metaxiotis et al., 2002)

5.1.4. Maximize Efficiency of Marketing. It's also a key advantage that is precious by the interviewees, for the reason that using AI in marketing can save money, time, resources, and labor and complete missions in a higher speed. On the one hand, certain AI applications such as chatbots, which can solve customers problems immediately without depending on customer service staff deal with them one by one, and AI voice, text, and image processing technologies, which can execute the tasks by itself without the help of human workers. On the other hand, AI promotes the efficiency in areas of data processing, decision-making, operation, advertising, product management, and delivery. Take product management as an instance, AI-based stocking systems will automatically record the variation of stock and the demand of each item in each period, then it can make precise predictions of the approximate demand in next period and do replenishment automatically. These kinds of applications tremendously raise the efficiency of marketing.

5.1.5. Maximize Convenience of Customers. The convenience of customers is not only the pursuit of consumers themselves but also treasured by every businessman to

survive in the fierce market competition. In the first place, one of the AI applications, automatic payments for subscribed items and household cost, avoids the phenomena of cutting down electricity, water, or network due to forgetting to pay the bill, which is to the great convenience of customers. Apart from that, the widely applied chatbots enables the immediately-respond customer service, customers needing not waiting in line for a long time for the assistance of customer service staff. In addition to automatic payments and chatbots, the products comparison function, automatic notification of price variation, and personalized recommendations are also in favor of the convenience of customers. These three applications are able to help customers keep up with the latest market information and make their shopping decisions wisely and reasonably.

5.2. MEANS OBJECTIVES

5.2.1. Higher Level Means Objectives. Higher level means objectives here refer to the ways where AI can contribute to marketing, having at least one lower level objective as the cause or an influencing factor, and contributing to fundamental objectives of AI in marketing. In short, higher level means objectives can be considered as subobjectives of fundamental objectives (Keeney, 1992).

5.2.1.1. Maximize one-to-one marketing. One-to-one marketing, which is also known as individual marketing and personal marketing, enables personalized interactions with customers, which can not only enhance the returns of marketing investment but also facilitate customer loyalty to the certain brand (Rouse, 2007).

5.2.1.2. Maximize customer service. Maximize customer service is also an important means objective of AI in marketing according to the transcripts of interviews, which contributes to efficiency of marketing and convenience of customers. AI accelerates the efficiency of communication by using chatbots answer most of the common questions, and it realizes 24/7 customer service.

5.2.1.3. Enable AI-powered fraud-combating systems. AI is a competent helper for finding out the fishing website or virus as well as detecting, preventing, or overcoming fraud and cyber attack in the payment procedures. Along with that, AI is also capable of updating customers' identifiable data consistently to prevent identity theft and generating personalized user models of payment authentication to secure payments.

5.2.1.4. Minimize cheating, bias, mistakes, or malicious behavior. This is another means objective of AI in marketing for its contribution to the reliability, security, and privacy of marketing. Using AI can eliminate the disloyal actions of human as well as some inevitable errors caused by human, because it's extremely impartial, rigid, and accurate.

5.2.1.5. Maximize confidentiality of data. Since the AI-based database is able to automatically collect, crunch, and analyze data and come to some general results and instructions, it can keep customer information under protection and unrevealed. Besides, the automatic payments take over the previous pay methods that all the credit card information needs to be revealed to salesclerks, agencies, or waiters. This can secure the credit card information from leaking out.

5.2.1.6. Maximize creativity and innovation. With the abilities to take over troublesome and repetitive jobs, adopting AI in marketing will leave people more time to brainstorm and do the creative and innovative work. In addition, AI also has the ability of facilitating creativity and innovation by trying different combinations of possibilities, which may make some breakthroughs since it can go beyond the fixed thinking models of human.

5.2.1.7. Maximize productivity of business. Machines do manufacture work much more efficiently, with a larger output and less lost in even shorter time. Besides, automatic purchase, for instance, the automatic replenishment and subscribing purchase, promotes more transactions and other commercial activities, in general, maximize productivity of business.

5.2.1.8. Minimize cost of production. Although the cost of building and maintaining AI systems is costly, due to the cost on writing algorithms, salaries of technicians and experts, and the fee of machine purchase and maintenance, the cost on labor force, the much lower productivity of human, and the lost caused by human fault is far more weigh the cost on AI. So adopting AI in marketing can minimize cost of production as a whole.

5.2.1.9. Maximize efficiency and accuracy of data processing. Using AI in data processing can eliminate arithmetical mistakes and build up the processing speed. Computers are much better than human on calculation and statistics, doing them more swiftly and more accurately. Therefore, using AI can maximize efficiency and effectiveness of marketing.

5.2.1.10. Maximize decision-making efficiency and accuracy. As the statements of the interviewees, is another valuable means objective, which will build up the efficiency and effectiveness of marketing. AI can not only stimulate the behaviors and thoughts of specialists of trading but take current circumstance and resources into consideration as well. Based on the overall consideration, AI is able to generate many flexible marketing strategies that can be consistently applied and adjust to the wave of change.

5.2.1.11. Maximize efficiency of operation. AI, taking over troublesome and repetitive work for human, enhances the managers' and leaders' creativity and enables firms to allocate more time to on innovation and creation to make some breakthrough (Kumar et al., 2019). Moreover, utilizing AI in marketing can optimize operation processes in the way of designing many kinds of new marketing processes, which are suitable to different situations. Then it can automatically and dynamically implement the specific operation processes generated based on its analysis and prediction.

5.2.1.12. Maximize efficiency in advertising. Advertising and promoting is one of the most significant segments in marketing for its function of increasing business profit and efficiency of marketing, which is also to customers' convenience. Utilizing AI to collect, process, and analyze customer data and then get the knowledge of the specific taste of each customer, which is the foundation of individual marketing, enables one-to-one promotion, personalized recommendations, and sending sale or price decrease notice to specific groups such as subscribers or exclusive customers.

5.2.1.13. Maximize efficiency of product management. Facilitating the efficiency of marketing, maximizing efficiency of product management is an essential means objective of AI in marketing, because of the significance of product management in the whole supply chain. AI is able to make predictions of the quantity of stock based on the previous sales volume and the market conditions and the market prospect. Then it can replenish the stock and make new transactions with the suppliers automatically and dynamically.

5.2.1.14. Maximize efficiency of delivery. It is also regarded as a vital means objective, for it's beneficial to improving business profit and efficiency of marketing. AI-based automatic sending and delivery cupboards are now very popular all around China; nearly every living zone has at least one of them. The cupboards enable 24/7 delivery and sending, which can automatically calculate the shipping fee of the items being shipped and secure the package waiting for delivery from being stolen by a unique code sent to their phone when their package is ready for delivery. The users can fill the waybill on the Internet, then they'll get a code, with which they can just leave their stuff in the cupboard to wait for the deliverer come and pick it up.

5.2.2. Lower Level Means Objectives. Lower level means objectives are the components, the cause, or influencing factors of higher level means objectives. In this paper, the 19 lower level means objectives are classified into eight groups, mentioned in the theoretical foundations section, based on the eight functions of marketing, which are shown as following.

5.2.2.1. Promotion. The means objectives in promotion area are “enable robocall in promotion” and “enable personalized recommendations”. Robocall in promotion includes both general advertising and specific promotion to a certain group of potential customers. Personalized recommendations means recommending customers certain items based on an aggregate analysis of one’s gender, age, social status, and previous cater.

5.2.2.2. Marketing information management. In this category, we only derived one means objective: “enable automatic data collection, processing, and analysis”. Utilizing AI to do data collection, process, and analysis is the most common and popularized function of AI in marketing. This value of AI is regarded as the basis of AI in marketing, for the database, decision-making systems, and many other functions of AI are all depends on the big data it collected and the results it obtained.

5.2.2.3. Customer service management. In this area, we derived three means objectives: “enable chatbots in customer service”, “enable products comparison”, and “enable automatic notification of price variation”. Chatbots are widely accepted and adopted nowadays in customer service, as it not only enables 24/7 responding but also enhances the efficiency and effectiveness of customer service with a consistent satisfactory attitude. Further, the utilities of comparing price and benefits of similar products and sending notifications to the customers when the price of the items they concerned is dropped.

5.2.2.4. Marketing decision-making. The means objective that was classified into this class is “enable AI based decision-making systems”. AI can generate comprehensive and dynamic decision-making strategies on account of machine learning and overall analysis, then automatically exert the strategies according to the situation.

5.2.2.5. Marketing operations. There are five means objectives belongs to this group, “enable automatic manufacturing, assembling, and packaging”, “minimize time spent on troublesome and repetitive work”, “minimize danger to human”, “enable automatic website builder”, and “enable natural language processing and image processing”. Besides, achieving the objective “enable automatic manufacturing, assembling, and packaging” will exert an influence on the objective “minimize time spent on troublesome and repetitive work”, which means the former one is a subobjective of the latter one.

5.2.2.6. Pricing and product management. Three means objectives were derived and classified into this area. They are “enable automatic demand recording and prediction”, “enable automatic replenishment”, and “enable flexible pricing”. The AI-based backstage management will dynamically adjust the selling price in the view of click rate, page views, quantity of sale, and popularity. Besides, AI can keep track of the inventory and automatically make replenishment.

5.2.2.7. Financing and security transaction. “Enable automatic payments” is the means objective in this classification. Automatic payments, as was mentioned by interviewees, is a useful function which gives rise to security transaction, thanks to it dynamic and diversified payment authentication and consistent updated identifiable data.

5.2.2.8. Transportation. In this area three means objectives were generated, which are known as “enable AI-powered temperature optimization in delivery trucks”, “enable AI-powered route optimization”, and “enable robot/drone delivery”. AI can help with route planning based on traffic, weather, and specific request of customers in both passenger transport and freight transport. In addition, in freight transport, it can

automatically record and sensor the temperature in delivery trucks to convey frozen or fresh items as well as use robots or drones to deliver packages when they arrived at the receiving post office.

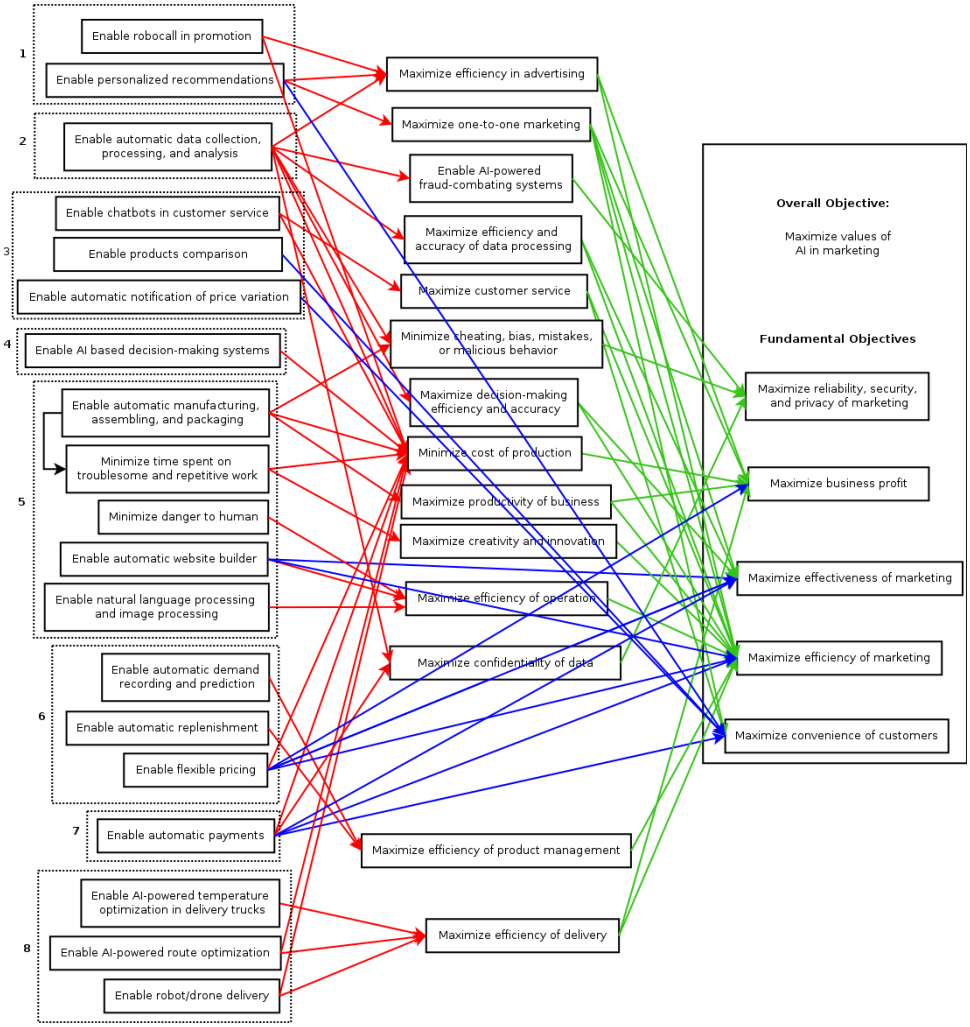

Figure 5.1 Means-Ends Objective Network

6. THERORETICAL AND PRACTICAL CONTRIBUTION

Form the theoretical perspective, this research paper builds a relatively up-to-date, overall, and comprehensive scheme of the values and impacts of AI in marketing, building not only on newly generated grounded theories in this research but also on the summarization and analysis of former researches and literatures. So it can build a more comprehensive and reasonable aspect of the values of AI in marketing for the educational circles to refer to in future study and research.

From the practical perspective, the research paper concludes what are the main values AI brings forward, which are shown as fundamental objectives in the means-ends objective network, as well as how does AI make the influences and generate these values, which can be regarded as means objectives. Since the network is generated on the basis of both existing literatures and textual data that collected through VFT based interviews, it's of much accuracy. All these fundamental and means objectives will indicate what are the expectations and concerns of AI in marketing as well as shed light on how to improve AI in marketing practically in future.

7. LIMITATIONS AND FUTURE STUDY

The primary limitation of this study is that the field survey we conducted was mostly in Missouri University of Science and Technology and we only got 40 subjects participated in the study when we achieved the saturation point. Although we also collected data from some marketing or AI professionals, most of the subjects are students older than 19 or other adults who are currently study at or work in Missouri University of Science and Technology. For future studies, more subjects from different background should be recruited as well as different research methodologies (e.g., survey) can be used to supplement this research. Another limitation of this study is the limited time and cost to do the research. We'll recruit more subjects of different background in future study to generate a more comprehensive and generalized outcome.

8. CONCLUSIONS

Based on the research results we obtained, we found almost all of the participants are in favor of using AI in marketing and believes in its competence in completing the work in a higher speed and quality, and its inevitable momentum of taking over most of human jobs, such as factory workers, truck drivers, and many other jobs no need of innovative thinking. And there's no big difference among the attitudes of participants who have different background; almost all of them placed more benefits and values of AI in marketing than the problems or concerns. So it's of great significance for us to research and study on the subject of values of marketing that are enabled by AI.

In this research, we use the Keeney's Value Focused Thinking approach to identify the values of marketing that are facilitated by AI. We have conducted interviews with students and other adults in a Midwestern University and some professionals in marketing units. The means-ends objective network, as shown in Figure 5.1, clearly demonstrates the values of AI in marketing as well as the relationships between them, serving as a good conceptual foundation for future research related to AI in marketing. The network also stimulates discussion in this area and open up new questions for future research. Business executives will find the means-ends objective network useful as they contemplate the introduction and/or further integration of AI in marketing.

APPENDIX A.

DEFINITIONS OF TERMS

Definition of AI: Artificial Intelligence is the simulation of human intelligence processes by machines, especially computer systems, including learning, reasoning and self-correction. (Rouse, 2018)

Marketing, in general, involves eight dimensions:

(1) Promotion: advertising campaigns and other actions that can attract potential customers and retain existing customers.

(2) Marketing information management: process of collecting, crunching, and analyzing data.

(3) Customer service management: management process of customer service, such as customers' data analysis, personalized and customized offerings, and consulting and after-sale services.

(4) Decision-making: decision-making process in marketing, such as how to choose and conduct the sales procedure, which distribution channels to select, whether and when to acquire the materials or commodities, what should be the sales prices and profit margins, etc.

(5) Organization development and market operations: development and transformation of marketing components in the organization and the evolution of the operation process of marketing and other functions in the organization to support sales and marketing.

(6) Pricing and product management: setting the price of a product at the appropriate and acceptable level and provide it at a reasonable and profitable quantity.

(7) Financing and securing transaction: process of securing sufficient funds, budgeting for marketing activities, facilitating check out and payment procedure, and security/privacy of transactions.

(8) Transportation: replenishment process that transports the goods from suppliers to sellers as well as the delivery process that transports the goods from the sellers to customers.

APPENDIX B.

DEMOGRAPHIC INFORMATION FORM

Demographic Information

1. What is your age?
    a. Under 18
    b. 18 - 24
    c. 25 - 34
    d. 35 - 44
    e. 45 - 54
    f. 55 and above
2. What best describe your gender?
    a. Male
    b. Female
    c. Prefer not to say
    d. Prefer to self-describe_____
3. What is your marital status
    a. Single
    b. Married
    c. Windowed, divorced, or separated
    d. Prefer not to say
4. What is the highest degree or level of school you have completed? (if you are currently enrolled in school, please indicate the highest degree you have received)
    a. Less than a high school diploma
    b. High school degree or equivalent

c. Some college, no degree

d. Associate degree

e. Bachelor's degree

f. Master's degree

g. Professional degree

h. Doctorate or higher

5. What is your current employment status

a. Student

b. Employed full time (40 or more hours per week)

c. Employed part time (up to 39 hours per week)

d. Unemployed and currently looking for a job

e. Unemployed and not currently looking for a job

f. Retired

g. Self-employed or homemaker

h. Unable to work

6. Major field of study:

Undergraduate _____

Graduate (if have)_____

7. If you are currently a student, which college and department are you in?

_____

8. If you are currently a student, what would likely be your first job after your graduation?

a. Professional occupations

b. Managerial and Technical occupations

c. Skilled non-manual occupations

d. Skilled manual occupations

e. Partly-skilled occupations

f. Unskilled occupations

9. If you are currently employed, what is your industry? _____

10. If you are currently employed, what is your occupation/profession

_____

11. If you are currently employed, what skill level do you think your job is

a. Professional occupations

b. Managerial and Technical occupations

c. Skilled non-manual occupations

d. Skilled manual occupations

e. Partly-skilled occupations

f. Unskilled occupations

12. What is your annual income before taxes?

a. Less than $24,999

b. $25,000-$49,999

c. $50,000-$74,999

d. $75,000-$99,999

e. Over $100,000

13. What is your annual household income before taxes?

a. Less than $49,999

b. $50,000-$99,999

c. $100,000-$149,999

d. $150,000-$199,999

e. $200,000 - $249,999

f. $250,000 - $299,999

g. $300,000 - $349,999

h. Over $350,000

14. Have you heard of AI?

    Yes / No

15. Do you understand the meaning of AI?

    Yes / No

16. Have your ever encountered Artificial Intelligence (AI) in marketing? (For example, robocall, chatbots, voice-based AI, text-generating AI, or AI image processing technologies, etc.)

    Yes / No If Yes, Application(s) of AI _____

17. Do you have any experience in marketing?

    Yes / No If Yes, Number of years _____

18. Rate the following AI applications according to your familiarity with them. Place a number (1 to 5) in the space to the left of the name given below, with 1 meaning that the AI applications are totally unfamiliar to you, and 5 meaning that you are very familiar with the diagram. You can use the same number more than once. (1 – Totally unfamiliar, 5 – Very familiar)

    __ Chatbot

__ Robocall

__ AI Voice, text, or image processing technologies

__ AI-based tailoring and recommending service

__ AI-based decision-making systems

__ AI-powered search engine optimization

__ AI in collecting, crunching, and analyzing data

__ AI-powered fraud-combating systems

__ AI-based automatic payments

__ AI-powered temperature recorders and sensors

__ AI-powered optimized and automated delivery

BIBLIOGRAPHY

1. Bharat, M. (2017). Artificial Intelligence in Web Design, Development and Marketing. Retrieved from https://www.motocms.com/blog/en/artificial-intelligence-in-web-design/.

2. Bhattacherjee, A. (2012). Social science research: principles, methods, and practices. Tampa, Florida. Textbooks Collection. 3.

3. Burgess, A. (2017). AI in Action. The Executive Guide to Artificial Intelligence, 73–89.

4. Chandra, H. (2019, September 26). Artificial Intelligence (AI) vs Machine Learning (ML) vs Big Data. Retrieved from https://heartbeat.fritz.ai/artificial-intelligence-ai-vs-machine-learning-ml-vs-big-data-909906eb6a92.

5. Clark, T. (2017, November 27). Why 2018 Is the Year of AI for Financial Institutions. Retrieved from https://www.paymentsjournal.com/2018-year-ai-financial-institutions/.

6. Cooper, P. (2018, June 5). Social Media Advertising Stats that Matter to Marketers in 2018. Retrieved from https://blog.hootsuite.com/social-media-advertising-stats/.

7. Duran, H. B. (2016, October 25). The Future Of Artificial Intelligence Marketing Is Here. Retrieved from https://www.alistdaily.com/strategy/future-artificial-intelligence-marketing/.

8. Dutt, D., Contributor, CSO. (2018, January 10). 2018: the year of the AI-powered cyberattack. Retrieved from https://www.csoonline.com/article/3246196/2018-the-year-of-the-ai-powered-cyberattack.html.

9. Dutton, G. (2018) Big Pharma Reads Big Data, Sees Big Picture: Linguamatics Brings Natural Language Processing to Non-Experts, Expediting Drug Development. Genetic Engineering & Biotechnology News, 38(1), 8-9.

10. Faggella, D. (2019, February 18). Artificial Intelligence in Marketing and Advertising – 5 Examples of Real Traction. Retrieved from https://emerj.com/ai-sector-overviews/artificial-intelligence-in-marketing-and-advertising-5-examples-of-real-traction/.

11. Gijs, O., Manuel, C., Rand, W., & Weishampel, A. (2019). Letting the computers take over: Using AI to solve marketing problems. California Management Review, 61(4), 156-185.

12. Glaser, BG. & Strauss, AL. (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research. New York: Aldine De Gruyter.

13. Grewal, D., Roggeveen, A. L., & Nordfalt, J. (2017). The Future of Retailing. Journal of Retailing, 93(1), 1-6.

14. Jarek, K., & Mazurek, G. (2019). Marketing and artificial intelligence. Central European Business Review, 8(2), 46-55. Retrieved from http://libproxy.mst.edu:2048/login?url=https://search.proquest.com/docview/2260989870?accountid=14594

15. Keeney, R. L., (1994). Creativity in Decision Making with Value-Focused Thinking. Sloan Management Review, 35(4), 33-41.

16. Keeney, R. L., (1999). Developing a Foundation for Strategy at Seagate Software. Interfaces, 29(6), 4-15.

17. Keeney, R. L., (1999). The Value of Internet Commerce to the Customer. Management Science, 15(4), 533-542.

18. Kumar, V., Bharath, R., Rajkumar, V., & Jim, L. (2019). Understanding the role of artificial intelligence in personalized engagement marketing. California Management Review, 61(4), 135-155.

19. Kühl, N., Mühlthaler, M. & Goutier, M. (2019, June 15). Supporting customer-oriented marketing with artificial intelligence: automatically quantifying customer needs from social media. Electron Market, 11(40), 11-17. Retrieved from https://link.springer.com/article/10.1007/s12525-019-00351-0.

20. Li, S. (2000). The development of a hybrid intelligent system for developing marketing strategy. Decision Support Systems, 27(4), 395–409.

21. Li, S. (2007). AgentStra: an Internet-based multi-agent intelligent system for strategic decision-making. Expert Systems with Applications, 33(3), 565–571.

22. Li, S., & Li, J. Z. (2009). Hybridizing human judgment, AHP, simulation and a fuzzy expert system for strategy formulation under uncertainty. Expert Systems with Applications, 36(3), 5557–5564.

23. Machiraju, S., & Modi, R. (2017). Conversations as Platforms. Developing Bots with Microsoft Bots Framework, 1–17.

24. Makridakis, S. (2017). The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms. Futures, 90, 46-60.

25. Martin, C., & Writer, S. (2019, October 17). AI Marketing Companies Attract $1 Billion In Q2. Retrieved from https://www.mediapost.com/publications/article/342145/ai-marketing-companies-attract-1-billion-in-q2.html.

26. Martínez-López, F. J., & Casillas, J. (2013). Artificial intelligence-based systems applied in industrial marketing: An historical overview, current and future insights. Industrial Marketing Management, 42(4), 489–495.

27. McGregor, K. A., & Whicker, M. E. (2018) Natural Language Processing Approaches to Understand HPV Vaccination Sentiment. Journal of Adolescent Health, 62(2), S27-S28.

28. Metaxiotis, K. S., Psarras, J. E., & Askounis, D. T. (2002). GENESYS: an expert system for production scheduling. Industrial Management & Data Systems, 102(6), 309–317.

29. Miikkulainen, R., Iscoe, N., Shagrin, A., Rapp, R., Nazari, S., McGrath, P., Schoolland, C., Achkar, E., Brundage, M., Miller, J., Epstein, and Lamba, G. (2018). Sentient Ascend: AI-Based Massively Multivariate Conversion Rate Optimization. Proceedings of the Thirtieth Innovative Applications of Artificial Intelligence Conference. AAAI.

30. Milgrom, P. R., & Tadelis, S. (2018). How Artificial Intelligence and Machine Learning Can Impact Market Design. The Economics of Artificial Intelligence: An Agenda, Agrawal, Gans, and Goldfarb. 567–585.

31. Moreno, J. (2009). Trading strategies modeling in Colombian power market using artificial intelligence techniques. Energy Policy, 37(3), 836–843.

32. Morgan, D. (2017, December 4). Dan Brown on God and artificial intelligence in his new thriller, "Origin". Retrieved from https://www.cbsnews.com/news/dan-brown-on-god-and-artificial-intelligence-in-his-new-thriller-origin/.

33. MTS. (2019, October 17). AI Tipped to Revolutionise Marketing Industry as Sector Attracts $2.5BN of Investments in 2018. Retrieved from https://martechseries.com/predictive-ai/ai-platforms-machine-learning/ai-tipped-revolutionise-marketing-industry-sector-attracts-2-5bn-investments-2018/.

34. Nah, F., Siau, K., & Sheng, H. (2005). The value of mobile applications. Communications of the ACM, 48(2), 85–90.

35. Pertiwi, P. (2018, March 14). Collaboration between Human and Artificial Intelligence (AI), the Future of Fraud Prevention. Retrieved from https://www.integrity-indonesia.com/blog/2018/01/22/collaboration-human-artificial-intelligence-ai-future-fraud-prevention/.

36. Peters, T. J., Waterman, R.H. (2015), In search of excellence. New York: Harper & Row.

37. Rancea, B. (2019, March 15). AI Website Builders: Are They Any Good? A Detailed Review. Retrieved from https://ecommerce-platforms.com/articles/ai-website-builders.
38. Rozga, S. (2018). Introduction to Chat Bots. Practical Bot Development, Apress, Berkeley, CA, 1–28.

39. Rohm, A., Kaltcheva, V., & Milne, G. (2013), A Mixed-Method Approach to Examining Brand-Consumer Interactions Driven by Social Media. Journal of Research in Interactive Marketing, 7(4): 295-311;

40. Rouse, M. (2007, March 22). What is one-to-one-marketing (1:1 marketing)? - Definition from WhatIs.com. Retrieved from https://searchcustomerexperience.techtarget.com/definition/one-to-one-marketing-11-marketing

41. Rouse, M. (2019, December 31). What is Artificial Intelligence (AI)? Retrieved from https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence

42. 7 Functions of Marketing Flashcards | Quizlet. (n.d.). Retrieved from https://quizlet.com/545303/7-functions-of-marketing-flash-cards/.

43. Shan, Q., Liu, Y., Prosser, G., & Brown, D. (2004). Wireless intelligent sensor networks for refrigerated vehicle. Proceedings of the IEEE 6th Circuits and Systems Symposium on Emerging Technologies: Frontiers of Mobile and Wireless Communication (IEEE Cat. No.04EX710), 525-528.

44. Sheng, H., Siau, K., & Nah, F. F.-H. (2010). Understanding the values of mobile technology in education. ACM SIGMIS Database, 41(2), 25.

45. Sheng, H., Nah, F., & Siau, K. (2005). Strategic implications of mobile technology: A case study using Value-Focused Thinking. The Journal of Strategic Information Systems, 14(3), 269–290.
46. Keeney, R. L., (1992). Value-Focused Thinking. Harvard University Press. , Cambridge, MA.

47. Sterne, J. (2017). Artificial intelligence for marketing: practical applications. Hoboken, NJ: Wiley.

48. Strauss, A. & Corbin, J. (1990). Basics of Qualitative Research: Grounded Theory Procedures and Techniques. Newbury Park, CA: Sage Publications.

49. The Seven Functions of Marketing with Examples. (n.d.). Retrieved from https://jgdb.com/business/marketing/marketing-function/the-seven-functions-of-marketing-with-examples.

50. Tjepkema, L. (2019, July 2). What Is Artificial Intelligence Marketing? Retrieved from https://www.emarsys.com/resources/blog/artificial-intelligence-marketing-solutions/.

51. Turban E., Outland J., King D., Lee J.K., Liang TP., Turban D.C. (2018) Intelligent (Smart) E-Commerce. Electronic Commerce 2018. Springer Texts in Business and Economics. Springer, Cham

52. Vieira, A., & Sehgal, A. (2017). How Banks Can Better Serve Their Customers Through Artificial Techniques. Digital Marketplaces Unleashed, 311–326.

53. Wayshak, M. (2018, March 28). How Artificial Intelligence is Changing Sales and Selling RIGHT NOW. Retrieved from https://www.marcwayshak.com/artificial-intelligence-in-sales/.

54. Weld, L. (1917). Marketing Functions and Mercantile Organization. The American Economic Review, 7(2), 306-318.

55. What is Marketing? - The Definition of Marketing - AMA. (2017). Retrieved from https://www.ama.org/the-definition-of-marketing-what-is-marketing/

56. Williams, R. (2018, October 3). Uber Eats harnesses AI for $6B in annual bookings. Retrieved from https://www.mobilemarketer.com/news/uber-eats-harnesses-ai-for-6b-in-annual-bookings/538724/.

57. Wirth, N. (2018). Hello Marketing, What Can Artificial Intelligence help you with?. International Journal of Marketing Research, 60(5), 435-438.

58. Yang, Y., & Siau, K. (2018). A Qualitative Research on Marketing and Sales in the Artificial Intelligence Age. MWAIS 2018 Proceedings, 41. Retrieved from https://aisel.aisnet.org/mwais2018/41/.

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