A Design of Strategic Real-Time Marketing Model in Smart Cities Based on the Internet of Things in the Fourth Industrial Revolution

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Abstract

Real-time marketing is an influential factor in creating a high engagement audience and is identified as event-driven marketing by instantly connecting with the customer based on events. Modern audiences are more expectant than ever, and the time has come when no one waits 24 hours for an update. Instant forms of communication (e.g., short message service, instant messaging, and social media services) remind us of the need for real-time marketing. The present study aimed to design a strategic real-time marketing model based on the Internet of Things (IoT) in smart cities in the fourth industrial revolution (4IR) in order to enable timely action on events and triggers on digital channels to capture pure moments with automation platforms and analytical and cognitive tools. In the current research, we applied a mixed-method and grounded theory with a systematic approach attributed to Strauss & Corbin to analyze the data and designed a model using three open, axial, and selective coding techniques. Data were collected using library and snowball sampling methods. The questionnaire was provided to managers and specialists following the identification of dimensions, criteria, and related sub-criteria, and the results were analyzed in an independent t-test. Moreover, the dimensions and components were prioritized applying the AHP technique. According to the results, entering the era of the 4IR, social media and mobile phones has shifted the common paradigms and the realization of scientific myths. Destructive technological stimuli with exponential growth and super-tendencies resulting from these transformations will create new images

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in the media, which highlights the optimization of micro-moments at the time of need to express goals and turn them into the content.

1. Introduction

Among the new discourses, the topic of the fourth industrial revolution (4IR) has had and will have dramatic changes in the prevailing paradigms and business model, which will lead to the creation of ecological and platform thinking. The fourth industrial revolution will eliminate barriers to businesses with its advantages, such as scalability, co-creation, and on-demand economics, and fundamental changes in the nature of fully-informed consumers will bring prosperity and wealth to societies. Communication bottlenecks are recognized bilateral in simple and friendly relationships since power and knowledge become one in the discourse space. Discourse gives meaning to human life since it increases support. This is where the power of the brand with real-time marketing emerges which denotes the intended meaning and creates mental involvement with the brand. This will make competition hard for other brands and decrease the possibility of advertising becoming a waste. At the same time, it reduces overhead expenses for finding new customers and advertising and increases organizational revenues in the long-term. On the other hand, the foundation is laid for meeting the needs of customers by immediate access to the audience.

A new chapter has begun in business models with the emergence of three modern powers, including increased communication, artificial intelligence, and decentralized production. This newly emerged plan is recognized as a platform. These businesses provide a plug and play (PnP) infrastructure, in a way that links value consumers and producers to each other [1]. Under such circumstances and given the fact that it is conceivable for the Islamic Republic of Iran to be affected by the 4IR, similar to other societies, it is necessary to present suitable models based on indigenous and value criteria to use its opportunities and prevent its threats and challenges. Nevertheless, this important topic has been overlooked in the available studies conducted in the field, a cause of which is a deep knowledge gap existing among the scientific community, politicians, managers, and decision-makers of the country in comparison to the global community pioneering in timely marketing and 4IR. In other words, there is no clear and integrated explanation of timely marketing in smart cities in 4IR and related discourses in the Islamic Republic of Iran. Moreover, no research has been conducted on the use of global experiences and development of the concept in the country, meaning that the concept and literature of timely marketing in Iran are strange and unfamiliar. Therefore, developing a codified, achievable, and Judicable model that can explain this concept is of paramount importance.

Therefore, the main topic of the present study was the lack of a strategic model of real-time marketing based on the Internet of Things (IoT) in smart cities in 4IR. To summarize, the origin of common models is the Western world, which cannot be used in the Islamic Republic of Iran considering its norms, values, and requirements. The 4IR is the era of smart cars, storage systems, and production facilities, which can be the extensive exchange of information, action initiators, and control of each other without human intervention [2]. All technologies and advancements have a common feature; advancements have presented the pervasive power of digitization and information technology. Cloud trends should be divided into three physical, digital, and biological sections to be recognized and to present an extensive picture of the technological stimuli of the 4IR. There are four main components in ecosystems: 1) interaction or engagement, 2) balance, 3) actors who are weakly connected with common goals, and 4) self-organization [3]. Consider the emergence of technology monsters; contrary to recent decades, "data" has been the main asset of the world's most valuable

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companies such as Apple, Amazon, Microsoft, and Facebook [4]. Today's platform is reinforced by digital technology, which eliminates temporal and spatial barriers and uses complicated smart tools to connect users and producers more easily and at a faster pace, compared to the past.

Some of the advantages of these platforms are eliminating gatekeepers, releasing new resources for value creation and supply, creating community feedback loops using data-driven tools, and turning the company from the inside out from marketing to information technology to operations and strategy and focus on people, resources and functions that exist outside the company by replacing or supplementing those that exist within a traditional business. The language used to describe the process of reversing the performance of one business to another is different. Creativity plays an important role in new paradigms governing businesses. Contrary to popular belief, Netflix did not kill Blockbuster. In fact, what caused Blockbuster to self-destruct was a failure to update the movie rental system [5]. Some of the largest companies in the world include Alibaba, Apple, Facebook, Google, Microsoft, New Crepe, Rakuten, Tencent, and Visa Implementers, which operate based on a set of various economic laws. Traditional manufacturing businesses purchase raw materials, manufacture things, and sell them to customers. However, the raw materials of adapters are different groups of customers, which allow them to connect them and do not buy anything from them. In fact, a part of things sold to members of their group is the access of their members to other groups. All of these occur in physical or virtual spaces, where the members of different groups gather together [6].

IoT applications have been created in many fields such as wearables, smart homes, smart cities, industrial automation, and many more, even in the field of marketing. Co-creation of value affects persistent customer tendencies and word of mouth tendencies. In fact, co-creation promotes the value of the active engagement of customers to create high-demand products that are prepared for order [6]. In a framework for smart city innovation, Nam & Pardo [7] considered three subtle dimensions of innovation, including technology, organization, and politics [8]. In addition, the UN has developed sustainability development goals (SDGs) that emphasize the end of poverty and other deprivations considered closely related to strategies used to improve health and education, reduce injustice and create economic development while we deal with climate change and protect our forests and oceans. After analyzing many studies, we confirm that the concept of smart cities can be used to realize many parts of SDGs of the UN [9]. Real-time marketing is a philosophical thought or school that emphasizes the presence of a flow of marketing and business activities [10].

2. Materials and Methods

When selecting a mixed approach, researchers should decide about the timing and temporal relationship between qualitative and quantitative components of a research and about the weighing of the relative importance or priority of data in one quantitative or qualitative way in order to respond to research questions. In the present study, a priority was given to the qualitative method. Three dominant approaches in foundation data processing theory can be distinguished: Strauss and Corbin's systematic approach (1998), Glaser's emerging approach (1992), and Charms' constructivist approach [11, 12]. In the current research, we used the grounded theory method with a systematic approach. The result of grounded theory is a theory that is classified as intermediate theory and is a nominal or data-based theory in terms of type. Therefore, we can reduce the gap between theory and practice. The grounded theory encompasses four main elements of concepts, categories, dimensions, and theorems [13]. Every human role is clear in different research approaches such as qualitative research and quantitative research. In other words, the human agency cannot be neglected in any research approach [14].

3. Statistical Population

Given the goal of the present research (i.e., real-time marketing at the national level), the statistical population included managers and graduates of basic technology in the field of IoT. Since the theory is fundamental and the entire statistical population was limited, the subjects were selected by standard targeted snowball sampling. Accordingly, we selected those who had sufficient information about the research topic and continued the process until reaching saturation.

4. Theoretical Sampling Implementation

Normally, subjects are selected by snowball sampling (chain reference) in the grounded theory method. The method is also known as theoretical sampling in some references since theoretical sampling is the same as selecting examples to generate theory [13]. A simple and accurate description of a method that occurs in a chain, sequential, simultaneous, lucky, and timely manner is a challenging task. It is not possible to stage a process in which many procedures are performed simultaneously and involve several back and forths. Therefore, the stages introduced henceforth are merely for initial acquaintance with this method. The coding stages in the grounded theory approach include: 1) open coding, 2) axial coding, and 3) selective coding

First step: Open coding

A) Primary Coding of a Sample of Interviews:

Table 1: An example of initial coding of interviews

Extraction of Primary Codes	Interview Text
1. Data collection 2. Data interpretation 3. Data implementation 4. Pre-scheduled campaign 5. Timely campaign 6. Trading with the customer 7. Data tracking 8. Timely customer recognition 9. Timely recommendations to customers	A brief review of the real-time marketing function. It is aimed to describe the miracle of the world of real-time marketing. First, we must understand what real-time marketing is and how its minimum infrastructures work. We should support the ability of unlimited operations in a special temporal framework. This, however, is not true since it is not unlimited since unlimited is a little creative. Therefore, we need an architecture that simultaneously supports medium traffic and unexpected couriers of events.

A part of the primary coding of interviews (OC4)
1. Data collection, interpretation, and implementation are three components of timely marketing.
2. Poster installation in a large store shows a pre-scheduled campaign.
3. However, if a seller shows the latest new collection of a famous brand in a store, it is a timely campaign.
4. Timely campaign enables us to trade with customers.
5. Timely marketing starts with data collection.
6. The method of timely data tracking is important.
7. Timely customer recognition
8. Timely recommendations to customers
9. ……….

B) Secondary coding and shaping the classes: in the next stage, the primary codes were turned into secondary codes due to their large number. Several secondary codes are turned into a

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concept code. The following tables provide a small section of open coding results based on secondary code, concept codes, and classes [15].

Table 2: Secondary coding and shaping the classes

Classes	Concept codes	Secondary codes	Frequency
Understanding and increasing the speed of advertising, branding, and social media influence	Increasing the speed of advertising and marketing and branding	Increasing the speed of advertising and marketing	30
	Increasing the speed of social media influence	Increasing the speed of social media influence	46
	Increasing the time spent on mobile devices	Increasing the time spent on mobile devices	50
	Decreasing the scope of attention	Decreasing the scope of attention	30
Increasing people's time spent on social media	Increasing people's time spent on social media	Increasing people's time spent on social media	49
Abundant speed of surfing the Internet	Abundant speed of surfing the Internet	Abundant speed of surfing the Internet	40
Blocking unrelated or unpopular messages and ads	Blocking unrelated or unpopular messages and ads	Blocking unrelated or unpopular messages and ads	30

C) Shaping the main classes: the next stage after determining the classes is creating general classes of theory, which are presented in the table below (Table 3):

Table 3: Creating the general classes of theory

Classes	Main Category
SMS (Short Message Service)	Instant form of communication creates real-time marketing
IM (Instant Massage) (Skype Messenger)	
	Changing customers to consumers and producers or informed prosumers
	The Internet is initiating a new era of information-sharing, collaboration, and user-based perspectives and user engagement
Satisfying the longing for the being at the moment	A company's ability to respond and submit content based on real-time events
Longing for being in the moment	
Customers' need for being in the moment	
Diversifying the content	

Third Step: Description of the Theorizing Stage (Selective Coding)

Data analysis was performed in SPSS and Super Decision software and the analytical hierarchy process (AHP) and t-test at the inferential statistics level.

5. Analysis of Demographic Variables of the Research Using Descriptive Statistics

According to the results, 71.4% of the responders were male and 28.6% were female. In addition, most of the subjects (62.9%) were in the age range of 40-50 years, and 57.1% and 42.9% of the participants studied in the fields of digital sciences and marketing, respectively. Furthermore, the majority of the responders (37.1%) had a marketing manager position.

| Proposition	P: Proposition=
P1	Technological stimuli such as the IoT in smart cities, ecological and platform thinking that create a scalable advantage for co-creation, and an on-demand economy.
P2	Fundamental changes in the nature of fully informed and completely related prosumers will remove barriers to businesses and leap of smart production of prosperity and wealth for societies.
P3	Real-time response strategies and approaches in digital channels to events and triggers will involve active individual activism.
P4	Large-scale personalization with real-time and relevant smart automation based on moments and micro-moments optimizes the customer experience of the brand.
P5	Feeling the need and smart targeting of customers based on a demographic, behavioral, or spatial context is the key to achieving the target audience.
P6	Correcting or rejecting previous or traditional marketing approaches is necessary to accept and develop new marketing paradigms.
P7	Monitoring and preventing risks and misuse of personally identifiable information (PII) have a significant impact on the representation of the privacy of the target audience.
P8	Using social media and marketing automation platforms to collect, analyze, and interpret data will revolutionize marketing.
P9	Social media listening and monitoring tools and analytics and computing tools with remarketing and retargeting is the key to success in instant hunting.
P10	Identifying opportunities leads to creating new audiences with high brand engagement by reducing costs per sales clue and maximizing return on investment by saving on advertising costs.
P11	Creating a dynamic insight into customer behavior leads to informed marketing decisions, two-way discourse, the art of conversation or dialectics, and sympathy with the audience.
P12	The decision-making roots are effectively identified and planned to be removed by examining the errors, distortions, cognitive biases, and mental traps of the audience.
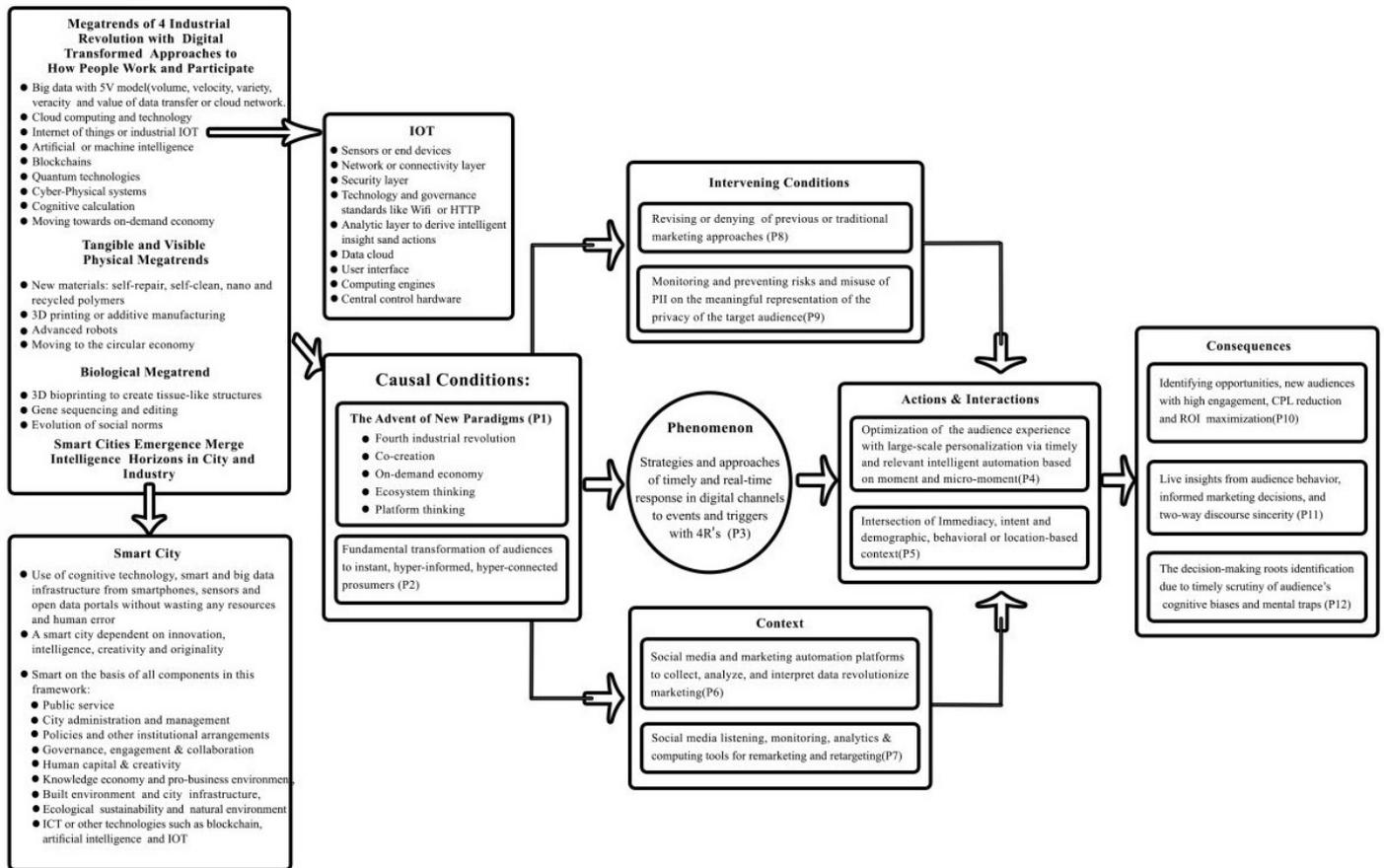
Figure 1: Real-time marketing paradigm model

6. Analysis of Research Hypotheses Using Inferential Statistics

At this stage, the questionnaire was provided to 35 managers and experts and the results were analyzed using an independent t-test following determining the dimensions, criteria, and related subcriteria. In the independent t-test, the criteria were approved at an error rate of below 0.05 and a confidence rate of 95%. According to the above table, the significance level of all criteria and sub-criteria was less than 0.05, and thereby approved.

Prioritization of criteria: in this study, the analytic hierarchy process was used to rank each group, prepared based on the pairwise comparison of alternatives. At this stage, the elites compared the criteria, decided about the subcriteria, and determined their advantages relative to each other. Notably, the comparisons were made using a non-quantitative table.

7. AHP Results

At this stage, pairwise comparisons of the criteria were formed and provided to 10 responders. Afterwards, the incompatibility rate of tables was calculated, all of which were less than 0.1, which showed the acceptable stability and reliability of pairwise comparisons. Following that, the answers were merged using the geometric mean method and are presented below in the form of paired comparisons. The weights of the pairwise comparisons were also measured using the geometric means method of Buckley.

8. Prioritization of Sub-criteria Related to the Criterion of "Emergence of New Paradigms":

8.1. Pairwise Comparisons

Pairwise comparisons of the criteria were formed in this section and performed based on a one-nine range.

Table 4: Introducing the subcriteria related to the criterion of "the emergence of new paradigms"

Symbol	Subcriteria
A1	Fourth industrial revolution
A2	Ecosystem thinking
A3	Platform thinking
A4	Co-creation
A5	Hyper- informed and hyper-connected prosumer
A6	On-demand economy

9. Estimation of Sub-criteria Weights

The weights of the sub-criteria were estimated at this stage by calculating the sum of the matrix column and dividing each number into the total columns, followed by estimating the linear mean of the number.

Table 5: Paired comparisons of sub-criteria for the emergence of new paradigms

	A1	A2	A3	A4	A5	A6
A1	1	5.34	6.01	4.75	8.55	7.17
A2	0.18	1	4.51	5.30	6.32	5.30
A3	0.16	0.16	1	5.17	6.32	6.05
A4	0.21	0.18	0.2	1	3.15	3.15
A5	0.11	0.15	0.15	0.31	1	3.15
A6	0.13	0.2	0.16	0.31	0.31	1

Table 6: The weight of the sub-criteria for the emergence of new paradigms

Criterion	Weight	Priority
Fourth industrial revolution	0.449	1
Ecosystem thinking	0.230	2
Platform thinking	0.164	3
Co-creation	0.077	4
Hyper- informed and hyper-connected prosumer	0.046	5
On-demand economy	0.031	6

10. Validity and Reliability

Since we all participate in a trade, we can naturally change our views. According to Schütz, the difference of opinion is due to the difference in the position of the observer. In this equation, a

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person's perception of the subject can be changed if he changes his position. Theoretical sensitivity refers to the characteristics of insight, skill in making data meaningful, ability to understand, and the ability to analyze relevant elements from irrelevant elements [16]. The researcher asks questions that relate classes to each other and then seeks evidence and events in the data. After developing a theory, the grounded theorist validates the process by comparing it with existing processes found in the specialized background. In addition, external browsers, such as the participants in this plan, judge the grounded theory using good science benchmarks and they may prove that the theory involves the validity of data. Validity and reliability are important issues related to the connection of metrics to structures because structures are often vague and not directly visible, and we want to have reliable and accurate metrics. Reliability means the credibility, compatibility, repetition, and continuity of a thing in the same and similar conditions, and has three types.

11. Conclusion and Recommendations

The main question raised in the present study was to achieve a real-time strategic marketing model in smart cities based on the IoT in the 4IR. We are exposed to marketing as we have never been exposed before. The use of social media is increasing rapidly as well as when it comes to smartphones. The scope of attention has decreased in a way that customers receive messages and advertisements from many different brands almost every day. Therefore, the amount of time spent on social media, and the ways brands use to sell are becoming more and more intertwined with the real world. We are surfing the Internet faster than ever before, and at the same time, unlike in the past, we can block messages and advertisements that we do not want or do not want to hear. Real-time marketing is constantly evolving in a way that marketers learn how to communicate with customers and make instant decisions based on the information and then send the related content to the right people at the right time. In other words, real-time marketing is exclusively related to the time component. The real-time marketing allows us to receive information whenever we want, which was once a dream. Of course, these technologies have been around us for years and are nothing new, but now we have been able to use the technologies well in marketing and it is no longer a dream. People are connected to their mobile phones and electronics all day and see the same things over and over again on social media. Now, how can we hunt a unique moment for our business. In order to review the business models to attract the audience, the following principles are necessary: 1) planning ahead, 2) newsjacking, 3) relevance, 4) lack of forcing, and relevance in reviewing marketing models. These four rules must be followed in content strategy planning. In content strategy, being timely and fast is everything. Any idea must be evaluated critically before being publicized. These questions should be asked when posting real-time information. Does this information offend anyone? Does the information have a negative impact on others? Is it right for someone who was killed or injured in an accident to be used in my business advertising?

The fourth industry is moving toward the fifth industry when you provide the opportunity for your customers to customize whatever they want. If the recent revolution emphasizes the transition of factories to IoT-based intelligent facilities that use cognitive and interconnected computing through cloud servers, the fifth industry is thinking of returning human hands and minds to the industrial framework. The fifth revolutionary industry is where man and machine blend together to find ways to work together to improve equipment and production efficiency. The fifth evolution can be common among many companies that have just now adapted to the principles of the fourth industry.

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