Customer Relationship Management Improvement using IoT Data

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Abstract: The Internet of Things (IoT) increasingly gains importance and costumers ale willing to pay for. Studies show that by 2020, more than 30 billion devices will be connected and the IoT platform market will grow to $ 7.6 billion in 2024. The purpose of this paper is to determine how IoT data could have a positive impact on customer relationship management (CRM). An empirical study has been conducted based on qualitative research methods with twelve experts in 2020 specialized in innovation marketing or CRM who have already participated in IoT projects in the retail industry. The results demonstrate that companies will be able to satisfy the customer's needs in a more precise way and that it is possible to predict the customer's behavior by analyzing generated data. Furthermore for most companies it is sufficient to implement a standardized CRM system because of their lack of knowledge in software development and interfacing opportunities. In this way, collected IoT data of the individual can be aggregated with already generated data from all other channels. Through this alignment, a holistic customer understanding about the purchased products, services, and wishes will be acquired and marketing activities can be targeted accordingly.

1 INTRODUCTION

Due to technological developments and the increasing inter-connectedness of the world population, the Internet of Things (IoT) has become reality (Abdul-Qawy et al., 2015). Devices such as smartphones, household appliances, machines, containers, vehicles, and people or even entire cities are increasingly connected to the internet. Equipped with sensors, they can communicate with each other (Hanselmann, 2015). They report their status, receive instructions, or take action on their own based on the information they receive. According to estimates by the American market research institute Gartner Inc., the number of networked things in 2020 will be about 26 billion worldwide. Due to the forecasted enormous growth, the IoT is attracting significant attention among experts (Lo and Campos, 2018).

Moreover, the IoT can fundamentally change the way of interaction between humans and their environment. The ability to electronically monitor and control objects in the physical world enables automated, data-driven decision-making to optimize systems and processes' performance, and improve the quality of life. Furthermore, the IoT can significantly change information technology's reach by interconnecting the real physical world with the digital world (Lo and Campos, 2018). In order to keep pace with this development, companies have to exploit new technologies and need agile structures that adapt to changes. Next to developing their technological infrastructure in line with this trend, companies have to investigate customer requirements. This valuable knowledge can be implemented for instance to improve the area of project management in order to deliver even better results to customers (Ploder et al., 2020). Besides, marketing benefits from the technological development. Being always in touch with the customer after signing a contract or selling a networked device enables new, service-supported business models (De Cremer et al., 2017). Every customer expects something different in terms of customer experience, interaction, and business relationships (Nguyen and Simkin, 2017).

Numerous research studies have been conducted on the technical aspects of IoT (Atlam et al., 2018). It could get difficult to gain a comprehensive knowledge of what exactly IoT means and its possible implications for Content Relationship Management (CRM). It seems that the potentials of acquired IoT data are insufficiently promoted. Besides, thinking in terms of customer problems, system alliances will take on a whole new meaning. Although there is a quite

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extensive literature focusing on technological use of IoT regarding business, marketing opportunities and customer relations have not yet been sufficiently explored. Technological innovations offer numerous new opportunities for the society which marketers in the B2C sector should focus on (Jara et al., 2012). Even tough traditional marketing principles remain present, technological innovations allow businesses and consumers to move closer together. Nguyen and Simkin (2017) found a few research gaps in IoT Marketing, such as integrating IoT channels and communication strategies or consumer engagements. As this development will continue, companies need to adapt to the latest trends and respond to customer requests as quickly as possible (Oglesby, 2018). Therefore, this paper shows how IoT technologies can improve CRM. It is intended to serve as 'food for thought' regarding future IoT scenarios in CRM and how best practices could apply to different areas. Therefore, the research question applies to customer goods and retail industry and is the following: How can IoT data improve Customer Relationship Management?

After the introduction in section 1, section 2 outlines the theoretical concepts followed by explaining the empirical study design in section 3. The results are presented and discussed in section 4 followed by a conclusion in section 5. Finally, Section 6 states the limitations of the proposed approach and hints at future research directions.

2 THEORETICAL BACKGROUND

To gain a piece of comprehensive knowledge about the terms used for this paper, this section shows definitions and explanations of the most important ones for the given research: digital marketing, IoT, CRM in digital marketing. To combine the terms in answering the research question, the last subsection is about the use of IoT in CRM.

2.1 Digital Marketing

Kotler, Kartajaya, and Setiawan (2010) became the first authors discussing the evolution of Marketing and starting with Marketing 1.0, which concentrates on a product, followed by Marketing 2.0, focusing on the customer, up to a humanistic Marketing 3.0, which turns a customer into a human being. As a consequence of these influences, successful businesses have to develop products, services, and corporate cultures that reflect human values. Currently, companies are transitioning into Marketing 4.0, which will deepen and broaden customer-centric marketing. It does not imply that traditional advertising media such as print, posters, or television advertising will disappear immediately from one day to another. A combination of offline but more online marketing will retain its functions, such as publicizing a brand in the first place. Nonetheless, the significant stimuli for sales promotion are already being generated by online channels and will increasingly continue to do so in the future. That signifies a shift of power towards consumers (Kotler et al., 2017).

Simultaneous to this development, Marketing conditions have continuously changed since the broad introduction of the Internet in the early 1990s. The applications and opportunities associated with this first period of the Internet are also designated as Web 1.0. In 2004, O'Reilly (2009) started to use Web 2.0 to describe people taking part in the Internet. According to Kreutzer (2016), the main characteristic of Web 2.0 is about active user participation. Hence, the potential of collective intelligence can be exploited to the greatest extent through the possibility of changing the contents by oneself and presenting one's creations. So-called user-generated content, i.e., content created and published by the internet users themselves, is a core element of Web 2.0. Several examples include forums and internet blogs for various topics.

2.2 Internet of Things

Concerning the hype about the concept of the IoT in recent years, it is not surprising to see many attempts to define the term. No official or unambiguous definition has been found in the literature (Dorsemaine et al., 2015). According to Atzori et al. (2010), different definitions exist because companies, research institutions, or stakeholders, depending on their interests or backgrounds, either see IoT from an internet-oriented or thing-oriented perspective, and accordingly find definitions in varying ways. Kevin Ashton, director of Auto-ID Center at MIT (Massachusetts Institute of Technology), and his collaborators are considered the inventors of the term IoT but used a rather long and sophisticated definition (Ashton et al., 2000). Since then, numerous terminologies have been published due to the technological development in IoT (Abdul-Qawy et al., 2015). Stephan Haller of SAP Research defines the IoT in a concise and precise way: "A world where physical objects are seamlessly integrated into the information network, and where the physical objects can become active participants in business processes. Services are available to interact with these 'smart objects' over the Internet, query their state, and any information associated with them, taking into account security and privacy is-

sues." (Haller et al., 2009, p. 15). The authors (Atlam et al., 2018, p. 928) add that "IoT can be considered both a dynamic and global networked infrastructure that manages self-configuring objects in a highly intelligent way". Whenever IoT is mentioned in this paper, the definition always refers to Stephan Haller's description as it includes all essential elements and is comprehensible. Despite the multitude of different definitions of the IoT, all have one aspect in common: integrating the physical world into the virtual world. Moreover, most authors agree that the IoT is designed to provide an IT infrastructure that facilitates data exchange between things in a secure and reliable manner (Weber, 2010). Nicholas Negroponte explains the use of IoT, combined with the right technology such as RFID as: "It's about embedding intelligence, so things become smarter and do more than they were proposed to do" (Vidalis and Angelopoulou, 2014, p. 15). Hence, the IoT is not only the interconnection of an object with the internet. (López et al., 2011, p. 285) restrict the definition as follows: "A 'smart object' is any object or product that is –by way of embedded technologies –aware of its environment and state, and it may have the ability to make its own decisions about itself and its uses, communicate state information, and achieve actuation under its control." To represent a smart object in the context of the IoT, it is not sufficient that it is only readable, recognizable, localizable, and addressable (Ibarra-Esquer et al., 2017). It is not enough to store data. Data have to be processed to react dynamically to changes (Minteer, 2017). Besides, a smart object should be able to respond autonomously (van Deursen et al., 2019). Consequently, it has to be equipped with software to act independently online without human intervention. That, in turn, requires that the smart device access the Internet (Fortino and Trunfio, 2014). If these prerequisites are fulfilled, it can be seen as a smart object in the IoT and could be used to support CRM.

2.3 CRM in Digital Marketing

A consistent orientation of all entrepreneurial activities towards the market is crucial to distribute the offered products and services (Herhausen, 2011). Bruhn (2016) describes Marketing as analyzing, planning, implementing, and controlling internal and external company activities that aim to achieve sales by aligning company performance with customer benefit in the sense of consistent customer orientation. According to Bloching et al. (2012), traditional advertising efficiency has been declining for years across all segments. The main factors are the multiplication of customer segments, products and brands, media and distribution channels, and international competition's intensification in our globalized world (Bloching et al., 2012). Whereas digital marketing causes comparatively low costs and generates a better-targeted audience (Dodson, 2016). Due to IoT's technical abilities, it will be even easier to recognize necessary factors of consumer demand in a more detailed way (Nguyen and Simkin, 2017). It empowers companies to understand customers and personalize technical products and services (Hoffman and Novak, 2018). Conversely, increased customer satisfaction leads to stronger customer loyalty, which has a positive influence on the company (Kumar and Reinartz, 2018).

Customer Centricity is a sales and marketing concept focusing on the customer rather than on the product (Shah et al., 2006). The value chain is designed in the following way: The expectations, needs, and wishes of the individual are the starting points for marketing activities (Gummesson, 2008). Human needs are a lack of something that they need because of nature. Purchase intentions are decisions of particular satisfaction seekers who also want to acquire something under given conditions. A purchase is then the actual acquisition of the specific satisfying person (Lo and Campos, 2018). As a new customer, the person will provide new initial data. As a returning customer, the person allows an even more personal relationship between the customers and the company (Waisberg and Kaushik, 2009). At the point of post-sale, long-term efforts become visible of how a company deals with customers who have already bought products (Reynolds, 2002). Cost benefits of keeping a customer is a reason why customer-centricity is not only about first-time purchases, but more about long-term customer relationships that may last a lifetime (Shah et al., 2006).

2.4 Use of IoT in CRM

Location-based technologies (Koühne and Sieck, 2014) enable the use of the customer's current location for marketing purposes. Location-Based- Advertising (LBA) "is a new form of marketing communication that uses location-tracking technology in mobile networks to target consumers with location-specific advertising on their mobile devices" (Telli Yamamoto, 2010, p. 125). In contrast to location-based marketing, proximity marketing makes it possible to locate customers precisely to inches and deliver content even more effectively than location-based marketing (van Deursen et al., 2019). For example, this allows a retailer to reach customers who are just passing their store. Geofence or GPS,

Bluetooth Low Energy beacons, and WLAN are the most common technologies used in proximity marketing (Rieber, 2017). Some department store brands are using Apple's iBeacon technology and a mobile marketing platform to provide customized promotions when downloading the brand's app. The customer can be informed about products or special promotions in the retail store via beacons during shopping. By reading the QR code or the NFC tag on the product, he can receive detailed background information about the specific product, such as what the product is made of, size, ingredients, warranty, instructions for use and cleaning (Kruse Brandão and Wolfram, 2018). Another possibility is NFC tags, which are small transponders that provide information on the mobile phone. It is sufficient to place the telephone within a range of a few inches of the transponder. In contrast to a QR code, the NFC tag can also be hidden and therefore built into objects (Kruse Brandão and Wolfram, 2018).

Every experience that a customer gains with a smart product, a supplier's staff, a store, or a call center is a moment that can influence the brand directly (Nguyen and Simkin, 2017). For instance, Google provides the smart thermostat Nest, which takes over the intelligent temperature control (Gregory, 2015). It learns when the owners are at home and in which room they are. The temperature in each room is then adjusted accordingly, so the customer always feels comfortable. Besides, it saves energy costs and in the same time, the environment is protected trough a lower energy consumption. Brands like Google use Customer Experience Management (CXM) as a critical differentiation to attract customers and engage and retain them. Thus, CXM no longer implies merely selling a product but creating added value and a close exchange between a brand and its customers - a shift from pure product sales to provided services (Gregory, 2015).

3 EMPIRICAL STUDY DESIGN

To answer the given research question in section 1, the qualitative approach of Mayring (2010) was considered the most appropriate methodology to get insights into this research area, since the combination of IoT and marketing as well as CRM activities are not sufficiently explored. Due to this reason, an exploratory study is the best way to extract not only new insights but also recommendations.

According to Flick (2007), the focus of an expert interview is less on the interviewee as a person than on his or her capacity as an expert for a particular field of action. Considering the expert's knowledge, their individual definition of IoT and practical experiences, expert interviews can give more in-depth insights into IoT Marketing and Services' current state.

For the purpose of this study, experts were selected based on the following criteria: (1) limited to consumer goods and retail industries, (2) employed at an international company, (3) age group 25 to 50, and (4) academic background and involved in data-driven marketing projects. The recruitment of the experts was done via telephone based on multiple searches. In the end, 12 interviews have been conducted, mainly in Europe. The experts' professional field and gained experience in either a customer goods segment or retail industry are given for all of them.

To stimulate the expert's creativity initially, they were asked to read three business scenarios beforehand provided by the researchers. Furthermore, the scenarios gave the interviewees the possibility to refer to those examples while answering the following interview questions. Those were created based on the identified gaps in the literature. To gain as much information as possible from the interviews and to keep the flow of the expert's speech uninterrupted, the questions were not asked in a strict order.

The experts were asked questions around the following topics: (1) their definition of IoT, (2) Current known and future application fields of IoT technology for CRM activities as well as benefits and challenges of it, (3) Characteristics of a good CXM and how to engagement consumers, (4) IoT support possibilities in marketing and CRM. Thereby, participants was given enough freedom to elaborate on their knowledge and experiences. In the end, the experts were also ask to reflect on the interview and state any additional comments.

After recording all the interviews, they have been transcribed using the software Trint[1] in a denaturalized manner. This simplified process focused on the content. The researchers aimed to standardize the data and correct interview noises or minor grammatical errors (Oliver et al., 2005). Applying the inductive method, categories were not created before the material was viewed, but were derived directly from the material, without referring to theoretical concepts used in advance (Mayring, 2010). For evaluating all information obtained, the professional analyzing tool MAXQDA2[2] was chosen. Dominating topics were identified that seemed relevant for the analysis and were extracted by filtering the material. For this purpose, coding of the text was necessary, which took place on creating a keyword index.

[1] https://trint.com

[2] https://www.maxqda.de

Furthermore, the authors suggest verifying the codes after working through 10-50% of the material. The authors reviewed the categories for appropriate proportions and possible designations after 30%. Subsequently, individual types were summarized. According to Krippendorff's Alpha, to measure the reliability of the intercoding, a test was carried out and showed a result of 70,31. Mayring (2010) and Krippendorff (2004) require values of at least 67. Since the intercoder only got a brief introduction to the topic and the coding system, this can be considered sufficient reliability testing as the coefficient is above the recommended 0,67 (0,73). After explaining data collection, the next section will show the results of the study.

4 RESULTS

During the data analysis of the twelve expert interviews more than 450 codes have been detected with the inductive research strategy based on qualitative research methods Mayring (2010). Based on the codes, the experts statements were classified into 17 different categories and afterwards grouped under the three main topics of (1) Internet of Things, (2) IoT Marketing/ CRM and (3) Future Implementations. Table 1 shows the frequencies of the aforementioned categories.

Table 1: Coding Process Results.

Main Topics / Categories	Frequency
Internet Of Things	
Analyzing Data	29
IoT Data vs. Big Data	29
IoT Definition	21
IoT Marketing/CRM	
Customer Experience Management	47
Data Collection & Tracking	37
Measurability & KPIs	37
Targeting	37
Purpose Marketing Activities	32
Engagement & Review	27
Changing Customer Journey	25
Customer Needs & Behavior	23
Customer-Centric Service	17
Future Implementations	
Future of Retail	48
Future of Wearables	29
General Future Perspective	20
Recommended Actions	20
Future of Dash Buttons	19

In the following subsections serve for a detailed explanation of frequent mentions in the interviews. The categories of Analyzing Data, Customer Experience Management and Future of retail were chosen based on relevance to the research topic and frequency of occurrence. Therefore every quote is related to a particular Interviewee (I) with a text mark for traceability reasons (number).

4.1 Analyzing Data

According to I2 (31), companies evaluate already generated data insufficiently, although enough information is available. Time pressure is an often cited reason. In some cases, there is also a lack of qualifications to evaluate data correctly mentioned (I2, 33). Another interviewee sees a challenge in analyzing data "if you combine the data from two different sources. That's not exactly the value that you get. You have to make sense of what is coming out from both, and then you can do something new" (I9, 11). "I have to say maybe 95 percent or 99 percent of the advertising I see is not even relevant for me. I would rather have less advertising but the ones which I maybe care about" (I9, 7). The reason is "if you have terabytes and terabytes of data it's practically useless because you cannot build any correlations" (I9, 21). I9 (31) mentions that data would not tell the employees how they want to be processed and analyzed, of course. According to I9 (29), "the worst thing that a company or individual can do is first to collect the data and then start thinking what do I need to do with all of this before collecting the data. Before doing anything, you need to be clear on what your end product is". Therefore, it is necessary to think about the right questions before businesses start to collect data for later use in marketing activities. For instance, which products are purchased at what time and in what quantity (I5, 16).

Moreover, the analysis of consumer behavior should propose order suggestions based on the preferences of customers "because I decided to organize a barbecue quickly, I drove past the store and bought Jever. Then Alexa could suggest Jever to me the next time I order a beer. And that's why branding is so important because I don't say to Alexa ´order a six-pack of Jever´; I'd probably say ´order a six-pack of beer´"(I4, 20).

4.2 Customer Experience Management

"Customer Experience Management is successful if the customer is enthusiastic" (I2, 21). An essential point for Interviewee 10 (19) is an appropriate customer experience for the product. "I don't want to be forced to have an excessive customer experience for a trivial product" (I10, 19). In addition, "it is simply im-

portant that the communication is not exaggerated. If you are constantly approached with consumer goods, I think there will be a flattening out or a sealing off of the consumer. That's why it will be imperative that the customer experience also considers providing the right amount at the right time to address the customer. Maybe you can do that again with wearables" (I10, 19). By "talking to my Alexa the company hopefully knows which tonality I prefer, and subsequently, the company could send an email that matches my tonality and not the initial slogan" (I4, 32). For I3 (29), the correct use of already generated customer data is not only an advantage, but also desired: "Now I download the Smart Home App for my dishwasher with the same e-mail address. In the best case, this would already provide a link based on your order data, which you also submitted. Do you agree that we use the data for the order?" (I3, 29). This enables companies to address customers precisely and make assessments based on where they live, and the social-economic background could be taken into account (I3, 29). I3 (21) further explain using the example of a malfunctioning, smart dishwasher, service staff could already see in their CRM system which model the customer has, how often it has been used and which program is used most often. The networked technology allows sensors to detect that a dirty pump. Now the customer can decide whether he wants to solve the problem himself or whether a technician should take a look. Even more innovative solution companies could consider finding the failure before the customer recognizes that something is not working and subsequently inform the customer to offer various options (I3, 21; I7, 29). However, I1 (35) says that companies should demonstrate transparency on the one hand, but on the other hand, they should not scare the customer by letting them know that they have detailed data stored (I3, 27). Therefore, I3 (27) recommends the continuous checking of data and touch points for improvements, which could lead to new product developments and eliminate user research.

4.3 Future of Retail

"I'm not sure if we will have an Amazon Go similar story in Germany now due to the regulations. But I think it will move in this direction" (I12, 3). The food sector is predesignated for this kind of concept since customers need not much consultation: "In general, I think that consulting will become less due to the possibility of getting information through the web, new technologies, smartphones, wearables, etc. or during the buying process" (I12, 3). Conversely, it could become more difficult for expensive products in need of explanation (I12, 3). The time factor (17, 5; I1, 3; I4, 5) and the convenience for customers (I7, 3; I2, 3) were mentioned as advantages of IoT retail, but at the same time, companies can also save costs through less personnel (I8, 3). I8 (3) believes that this concept might be interesting for several companies in the game, i.e., not only for marketplace providers but also for payment providers. Benefits from all the customer information would attract shop operators and companies like PayPal or Mastercard. I10 (3) thinks that Apple Pay could establish itself as a future payment option in stores since contactless payment with mobile phones is simple and secure. "I believe that the barrier to such services, mostly based on sensor technology and networking with RFID technology, will decrease and that acceptance will increase and then spread very quickly. I would almost say that this will be disruptive" (I20, 3). The expert adds that introducing this technology in countries such as Asia or the US will be relatively quickly established. Still, in Europe, it might take longer in terms of data security. Also, technical equipment and operation overhead are currently still expensive.

However, most of the experts agreed that retail's future is moving towards concepts like Amazon Go. "I think convenience will prevail in everything, whether privacy or anything else" (I6, 3). Furthermore, "the pain at the checkout is high enough" (I6, 3). I2 (5) could imagine a similar concept for petrol stations. Nowadays, people are very busy; if they are on the highway, they want to be at their destination quickly. The interviewees see an advantage in an automatic recording system that can identify the license plate number and debit the credit card amount. The fashion industry could also benefit from the use of IoT technologies (I6, 5; I7, 9). I6 (5) states an example: "I can take a look into virtual shopping carts, so to speak, at what people trying on, what they don't like" (I6, 5). Accordingly, businesses can examine whether they do no longer order individual clothes cuts.

5 DISCUSSION

Based on the literature research and the qualitative empirical study, the authors investigated how IoT data can be used for CRM and which impacts occur in the relationship between companies and customers.

All of the interviewed experts agreed on the retail industry's future moving towards self-service, such as Amazon Go. Furthermore, it is crucial to implement a standardized CRM system, aggregate collected IoT data of the individual, and align them with already generated data from all other channels. A holistic

customer understanding about the purchased products, services, and wishes will be acquired through the alignment of all data.

Once the customer purchases an IoT device, companies can retrieve data and contact the customer. Lo and Campos (2018) laid out that thereby, companies will be able to more easily satisfy the customer's needs. Besides, it is even possible to predict the customer's behavior based on the analysis of collected data. In that sense, it is essential to focus on operating in a customer-centric way throughout all activities as already found by Shah et al. (2006). Delivering an individual customer experience, the customer-centricity approach supports the creation of new business models within the context of IoT. To that extend, the use of IoT in CRM allows for more tailored services and, thus, more revenue to generate. Businesses need to align omni-channel and cross-channel for their communication to reach their respective customers Lo and Campos (2018). This is because the customer decides about the channel of interaction. In other words, companies should not only maintain contact with their customers via all touch points but also pay close attention not to disadvantage customers based on their communication preferences. The retail industry especially can create a more comprehensive and improved ecosystem and enable bi-directional real-time interaction with consumers inside and outside the stores Nguyen and Simkin (2017). Through the fact that most customers are permanently online via their smartphones, retailers should use this device as a touch point for all interactions to exploit the potential of IoT integration. Therefore, as found in the interviews location-based beacon technology is an option for retailers to interact with their customers when entering the store directly. Based on the beacon technology, the customer can be informed about products or special promotions in real-time at the retail store. From a customer's perspective, that helps to encourage a purchasing decision. Altogether, this shows how IoT data can be applied to improve CRM.

6 LIMITATIONS AND FUTURE RESEARCH

Since twelve experts were interviewed for this empirical study, the consent may not reflect the entire population's opinion or understanding of IoT applications in CRM. Therefore, the results are not generally valid, as most of the experts come from Europe. Due to the subjective selection of experts, a distortion of the results may occur. Furthermore, it cannot be excluded that the experts have a positive perspective on the subject due to their attitude and proximity to the survey topic. Besides, it wasn't easy to classify the answers of the interviewees into the respective categories. As there were frequent overlaps of the content, it wasn't easy to draw clear boundaries. This paper focuses on future marketing and CRM processes and tries to provide the first impulse for IoT in marketing. Nevertheless, there is a need for a much more deepened understanding of the effects of IoT. Particular attention should be paid to communication and marketing strategies designed for IoT purposes aiming to reach customers according to their needs. Further quantitative research should be conducted to identify how consumers perceive tailored promotions and services instead of traditional marketing measures.

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