The Possibilities and Challenges of the Application and Integration of the Internet of Things for Future Marketing Practice

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ABSTRACT: As the Internet of Things (IoT) is emerging as a major trend and is expected to have a huge impact on economy, marketers are challenged to act upon the possibilities and challenges that come along with this phenomenon. This research will provide an understanding of the possibilities and challenges of using Internet-of-Things-generated data for the marketing practice. A critical literature review identifies these possibilities and challenges along the elements of the 4P marketing model. The Internet of Things creates possibilities for marketing from the creation of smart, connected products and user development to new pricing models, more accurate customer segmentation and personalized marketing campaigns. However, identified challenges are perceived privacy and security issues and the need for the attraction of new skills and capabilities to deal with the complexity of IoT. In addition to the literature review, a field experience study showed that a lot of possibilities and challenges as identified in the literature were considered as such in practice. Still, the extensive application and integration of IoT is only found in a few cases as most companies are still in research and planning phases before applying this technology into their business for marketing purposes.

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1. INTRODUCTION

The Internet of Things (IoT) is emerging as one of the major trends shaping today's world. The basic idea of this concept is the pervasive presence around us of a variety of *things* or *objects* – such as RFID tags, sensors, actuators, mobile phones, etc. -, which through unique addressing schemes are able to interact with each other and cooperate with their neighbors to reach common goals (Atzori, Iera, Morabito, 2010). The term Internet of Things was first coined by Kevin Ashton in 1999 in the context of supply chain management. However, in the past decade, the definition has become more inclusive covering a wide range of applications such as healthcare, utilities, transport, and many more (Sundmaeker, Guillemin, Friess, Woelfflé, 2010). From a conceptual standpoint, the IoT, also known as Ambient Technologies or Embedded Systems, builds on three pillars, related to the ability of smart objects to: (i) be identifiable, (ii) to communicate, and (iii) to interact – either among themselves, building networks of interconnected products, or with end-users or other entities in the network.

A number of companies and research organizations have offered a wide range of projections about the potential impact of IoT on the Internet in general and the economy for the next decade. Morgan Stanley expects 75 billion networked devices by 2020 (Danova, 2013) and the McKinsey Global Institute expects that the financial impact of IoT on the global economy may be as much as $3.9 to $11.1 trillion by 2025 (Manyika, 2015). Even though the predictions vary, collectively they paint a picture of significant growth and influence. Bosch (2014) even referred to the emergence of the Internet of Things as the fourth Industrial Revolution. Fjord and Accenture (2015) highlight the magnitude of this phenomenon by describing lots of possibilities of IoT application in the area of our homes, our families, our transport, our shopping, our leisure time, our bodies, our jobs, our money, our learning and our cities. In short, the Internet of Things will be everywhere with major impact on society and economy.

A specific area in which this information processing will be of influence is the marketing practice. Over the past decades, there have been quite a few ways in which marketing managers have integrated information technology (IT) to enhance their marketing practice. A few examples are customer relationship management (CRM) software, sales force automation (SFA), extranets and cookies. Researchers have confirmed that interaction with the customer through IT is strongly related to firm performance (Brodie, Winklhofer, Coviello, Johnston, 2007; Wu, Mahajan, Balasubramanian, 2003). In addition, Trainor, Rapp, Beitelspacher and Schillewaert (2011) confirm that market orientation and technology orientation both are important drivers for a customer centric approach to marketing which improves firm performance. Nowadays, the relatively new firm performance enhancing technology, the Internet of Things, is identified as one of the Key Marketing Trends in a recent report published by IBM and Silverpop. Marketers will be challenged to engage the customer with the right message at the right time as customers interact with the hyper-connected Internet of Things. To be successful in IoT-directed marketing practice, it requires a platform from which the marketer can extract data to create effective, contextually cognitive marketing campaigns that will serve to influence customer intent at an unprecedented level (Rochlin, 2016). Armstrong (2015) emphasizes the increasing role of the marketer in organizations: the vision of the marketer will more and more shift from cost center to revenue driver. Due to the predicted size of the impact of the Internet of Things and the identification of it as a marketing trend combined with the rise of the marketer, it is of importance to marketing practice that marketers gather insight in the possibilities and challenges of this phenomenon. Therefore, this research will create a clear insight in the challenges and possibilities for managing and processing information created from Internet-of-Things-generated data for application and integration of IoT for the marketing practice. In short, this research will aim to answer the following research question:

"What will be the challenges and possibilities when using Internet-of-Things-generated data for the marketing practice?"

This research helps to explore the possibilities and challenges of the integration and application of the Internet of Things for future marketing practice among the elements of the 4P model of marketing proposed by McCarthy (1960). The 4Ps are:

1. Product
2. Price
3. Place
4. Promotion

The remainder of this article will be structured as follows. Section 2 starts off with an explanation of the theoretical framework, followed by the challenges and possibilities of the Internet of Things among the dimensions of the 4P model as identified in literature. Section 3 introduces field experiences among different companies illustrating the application and integration of the Internet of Things in practice. Section 4 compares the findings from literature and practice. Section 5 concludes the research and provides recommendations for further research.

2. IOT AND MARKETING PRACTICE

This research confined itself to the study of the challenges and possibilities of the application and integration of the Internet of Things for future marketing practice among the dimensions of the 4P model. The elements and underlying thoughts of the 4P model are discussed in more detail to provide the reader with a more comprehensive understanding of the theoretical framework of this research.

2.1 4P Marketing Model

Culliton (1948) described the marketing executive as a "mixer of ingredients" who sometimes follows a recipe prepared by others, sometimes prepares his own recipe as he goes along, sometimes adapts a recipe to the ingredients immediately available, and sometimes experiments with or invents ingredients no one else has tried. McCarthy (1960) grouped a long list of the marketing ingredients to a framework emphasizing the paramount importance of the customer with four major variables: product, price, place and promotion, or the 4Ps.

The *product* element covers everything to do with the creation, development and management of products. It is not only about what to make, but also about when to make it, how to make it, and how to ensure it has a long and profitable life (Brassington, Pettitt, 2006). *Pricing* is often

regarded as the least exciting element of the marketing mix (Blythe, 2006). However, it can reinforce or destroy other elements of the marketing mix as pricing not only includes a straightforward calculation of costs and profit margins, but price also has to reflect issues of buyer behavior (Brassington, Pettitt, 2006). *Place* is a very dynamic and fast moving area of marketing and it looks at the structure of channels of distribution. (Brassington, Pettitt, 2006). Getting the product at the right place, at the right time and in the right quantities is prerequisite for consumers to buy the products (Blythe, 2006). The *promotion* element of the marketing mix is basically about communication, and is seen as the most glamorous and sexy end of marketing (Brassington, Pettitt, 2006). Figure 1 presents a summary from DesTechWiki of the marketing mix elements.

Figure 1. The elements of the marketing mix

The 4Ps are interrelated and in order to create competitive advantage, the marketing manager should accurately blend all four elements to achieve organizational goals as well as customer satisfaction (Singh, 2012). The best strategy for creating value from the 4Ps, would be to continually change as consumer behavior and the uncontrollable variables involved in the marketing mix change (McCarthy, 1960).

The marketing mix is a relatively old model, and has been subject to many different revisions. For example, Judd (1987) proposed a fifth P for the model: *people*, Booms and Bitner (1981) introduced an expansion of the marketing mix by adding three additional Ps to make the model applicable for the service industry: *participants*, *physical environment* and *process* and Kotler (1986) added *political power* and *public opinion information* to the mix. The marketing mix has been the topic of many studies and has been subject to many revisions by many different authors. Goi (2009) even wrote an article on the review of the marketing mix and summarizes many different suggested models based on the traditional marketing mix. So, the examples mentioned above are only a small grasp from all different suggested models. Another well known revision of the 4P marketing mix is the 4C (*customer's solution, cost to customer, communication* and *convenience*) marketing mix emphasizing the importance of the consumer's perspective as opposed to a marketing management perspective. Moreover, Constantinides (2002) introduced a marketing mix model that is compatible with E-commerce: the 4S (*scope, site, synergy* and *system*) marketing mix.

Motivation for selection of theoretical framework

The 4P marketing mix is considered to be a general marketing tool that does not clearly distinguish between specific industries or marketing areas, which makes it applicable for many marketing practices. The wide acceptance of the 4P marketing model is a result of profound exposure to the model during college years and the practicality and memorability of the model (Jobber, 2001). Also, marketing managers identify the 4Ps as the controllable parameters that are likely to influence the consumer buying process and decisions (Kotler, 2003). The 4Ps of marketing remain a fundamental basis of the marketing practice for value creation to both the customer and the organization. The general acceptance and applicability of this model makes the 4P model a suitable marketing model for assessing relatively new topics such as the application and integration of the Internet of Things for future marketing. Therefore, this research will identify the challenges and possibilities of Internet-of-Things generated data from IoT platforms along these four elements. For each of the 4Ps, the possible application of the Internet of Things, and the new dimension IoT will bring to each P will be identified. Considering the relatively new topic of this research, the scope of this study will not be limited to a specific industry or marketing area. This research investigates whether the Internet of Things poses possibilities for enhancing the ability to meet the continuous need for change as described by McCarthy (1960).

2.2 Challenges and Possibilities of IoT

This section identifies the challenges and possibilities of the application and integration of the Internet of Things for future marketing practice along each element of the 4P model as presented in the previous section. All results are based upon existing literature and translated to a position within the theoretical framework to make them applicable for marketing practice.

We can distinguish two areas of application of the Internet of Things within an organization. A company can use the Internet of Things internally, for improvement of internal business operations or processes (e.g. to reduce energy consumption, monitor status of plant and equipment), and/ or externally, in its products or services (e.g. embedding sensors in products, developing services utilizing data generated by IoT technology) (Witchalls, Chambers, 2013). For the elements of the 4P model, both forms of IoT application are relevant. Therefore, this section will include elements of both internal and external IoT applications for different marketing purposes within the marketing mix.

2.2.1 Product

Through the introduction of the Internet of Things, a new light has been shed on the way products work. A crucial role in the Internet of Things is played by RFID systems and sensor networks. They can be used to monitor objects in real-time without the need of being in line of sight or being directed by human operations. This allows for mapping the real world into the virtual world (Atzori, Iera, Morabito, 2010). The degree to which this monitoring capability is integrated into smart, connected products is divided into four areas by Porter and Heppelmann (2014), as shown in Figure 2, where each area builds upon the preceding one. Ultimately, products can function with complete autonomy, applying algorithms that utilize data about their performance and their environment and

leveraging their capability to communicate with other products.

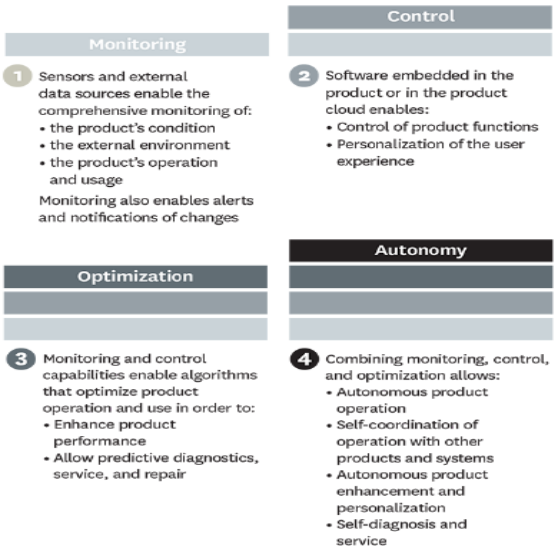

Figure 2. Capabilities of smart, connected products

Logically, by integrating sensors, applying algorithms and creating autonomous products, the complexity of products and their development highly increases. Besides changing the complexity of products, the Internet of Things also changes the nature of products. Whereas in the earlier days, all product features were integrated in the physical product, many new features of IoT based products are driven by software interaction on both the device and in the cloud (IBM, 2015). These products revolve around multi-device access and close ties to accompanying services.

A large aspect of the accompanying services that are integrated with the new generation of IoT products, is that of after-sales service. The purchase of a new product no longer stops at the check out of a store, but evolves through the years that the product is in use. The Internet of Things offers major improvements in predictive maintenance and service productivity (Porter, Heppelmann, 2015; Manyika, 2015). The marketer will be able to provide the customer with continuous product support and timely product maintenance. In addition, he could offer new product features and services.

In return, the customer will provide the marketer with useful information through the use of the product. The IoT-generated data that arises from the use of smart, connected products introduces revolutionary possibilities to the marketer. One of marketers' biggest challenges is determining customer needs and closing the knowledge gap companies have about their customers. Customers using smart, connected products generate valuable information for the marketer that can be translated to meaningful insights in customer needs and preferences. In its turn, these insights will assist the product development team in optimizing the product according to customer wishes. Eventually, data can even be used to predict customer behavior and needs (Manyika, 2015), allowing marketers to anticipate on future market changes and adjust products to meet predicted needs.

As introduced above, a huge possibility that the Internet of Things allows for is the development of smart connected products that dramatically expand opportunities for product differentiation and customization, moving competition away from price alone (Porter, Heppelmann, 2014). IBM (2015) supports this by recognizing that products are more and more tailored for specific markets to address slightly different preferences. The Internet of Things allows for more differentiated and unique, outstanding opportunities to enhance the experience of the individual customer. This customer experience is increasingly seen as a key competitive advantage (Armstrong, 2015). Offering of distinct experiences leads to higher customer engagement and creates advocacy and loyalty. Therefore, improved customer experience enhances customer retention and repeat purchases, resulting in revenue increase.

Another possibility that the Internet of Things poses for the marketing practice, is that the interconnected products can create insights to drive real-time customer driven innovation. The idea of involving customers in the development process is variously known as user-centric innovation, outside innovation, mass collaboration, wikinomics or crowdsourcing (Technology Pioneers, 2008). It has already long been recognized that users are an important source of innovation (Flowers, Mateos-Garcia, Sapsed, Nightingale, Grantham, Voss, 2008) and that customers constitute a valuable supply of ideas, manpower, skills and innovation (IBM, 2015). The probably most famous example of a user-generated product is Wikipedia, the online encyclopedia. Much of this co-creation has been made possible by the Internet and its ability to connect people with each other, but the Internet of Things makes it possible to take this process to a whole new level. Whereas in traditional product development the only product design feedback is through sales and customer complaints, the real-time analysis with machine-to-machine, machine-to-infrastructure and user-to-machine communication in IoT based products allows for a continuous adoption to changing circumstances (IBM, 2015).

The Internet of Things is able to take user development to the next level by making the development real time and continual (Accenture, 2015). To learn dynamically and update products much faster and more efficiently than in the past, a proactive approach is required to apply analytics to obtain meaningful insights. Marketing managers and product developers no longer sit back and wait for feedback results to come in, but they now have the opportunity to be one step ahead by analyzing the IoT created real-time data and act upon the insights immediately. Even more, the services accompanying smart, connected products should be treated as R&D for product development (Daugherty, Banerjee, Negm, Alter, 2014). To accelerate the pace of innovation in the IoT world, engineers need a system that helps them to do so. There have been multiple systems proposed by researchers to enable user-innovation and market-based innovation in an IoT world. Kortuem and Kawsar (2010) proposed a set of connected marketplaces that provide users and developers with multiple opportunities for creating and sharing innovative artifacts. The tools and platforms in the IoT space allow users to create, discuss and share new physical devices, software artifacts and object representations. When integrated into a connected marketplace, they enable effective user innovation in the IoT world. In addition, IBM (2015) introduces the term *continuous engineering*: "an enterprise capability designed to speed the delivery of increasingly sophisticated and connected products by helping businesses better meet the

accelerated pace of change". It helps address complexity issues through systems engineering, product line engineering and strategic reuse of design information and configuration management. Moreover, it assists in ensuring privacy and security of sensitive data. Even more important to the marketing practice, is that the process of continuous engineering allows for quality improvement, reduced cycle time and fast adaption to change to guarantee a customer driven product development approach.

Besides all new possibilities that the Internet of Things creates for products, the internal processes through which these products are created are also subject to change due to the rise of IoT. Not only *what* product companies make changes, but also *how* companies make it changes. Almost all companies feel the pressure to increase their results, and reducing costs is always one possible way to achieve better net operating results. Connecting and integrating things might offer new options for cost cutting (Bosch, 2014). Watson (2012) concludes that Machine-to-Machine (M2M) business models based on increased efficiency and cost saving are expected to be most successful in the near term driven by multiple factors among which a maturing ecosystem and rise of the cloud computing system. Moreover, Chui, Löffler and Roberts (2010) emphasize the possibilities of closing the loop from data to automated applications through the Internet of Things and the resulting productivity rise, as systems that adjust automatically to complex situations make many human interventions unnecessary. Marketers are therefore not only challenged to be innovative in determining customer needs and translating them to product development, but are also challenged to optimize the internal processes towards creating smart, connected products themselves. The Internet of Things allows them to increase efficiency of all resources by, for example, minimizing waste, reducing administrative work, shortening cycle time and establishing autonomous systems, all to serve one main goal: cut costs to increase profit margins.

A major challenge in IoT based product development is the perceived privacy and security issue. A survey by Fortinet (2014) showed that 69% of the questioned people said to be either extremely or somewhat concerned that a connected appliance could lead to a data breach or exposure to sensitive private information and the majority of respondents considered privacy to be important and did not trust the data usage of connected devices. Rose, Eldridge and Chapin (2015) identified several security and privacy concerns for the Internet of Things. Not only users, but also authorized objects have access to data. A characteristic of IoT is that it is deployed at massive scale. This quantity of interconnected links causes unpredictable and dynamic generation of data. Also, the user has no clear insight in the internal workings of the device due to the complexity of the product, causing unintentional collection of information. For privacy matters, the "I agree" consensus disappears when sensors act autonomously, causing invisible data collection. Moreover, there is a difference in social norms and expectations considering privacy, making it difficult to set up clear privacy guidelines for IoT exploitation. Dealing with these issues is important in the product development and consumer adoption process of IoT-based products. If people do not believe that connected devices and their information are secure from misuse or harm, the resulting erosion of trust will make them reluctant to the use of IoT-based products (Rose, Eldridge, Chapin, 2015). To guarantee safety and security of private information for both human and authorized object access of data, companies can reinforce several mechanisms. To safeguard information, an access control mechanism and an object authentication process should be put in place. To ensure privacy, general privacy models for IoT have been proposed and a company should establish innovative enforcement techniques and data governance. Flexible trust negotiation mechanisms should be introduced in order to meet scalability requirements that arise at all levels of data gathering (Miorandi, Sicari, De Pellegrini, Chlamtac, 2012).

Another challenge to most product-centric organizations, is the attraction of new skills and capabilities required to create IoT-based products and additional services. This requires significant effort and investments, usually without short term clear returns on investment (Bonnet, Buvat, Subrahmanyam, 2014). Besides attracting the capabilities to create IoT-based products, there is an even higher need for understanding the IoT-generated data to create meaningful insights. A study of IBM (2015) acknowledges the inherent complexity of IoT environments and the need for solutions to manage this complexity.

2.2.2 Price

Even though the Internet of Things moves competition away from price alone, marketers do find possibilities and challenges of the Internet of Things in pricing their products. Knowing how customers actually use the product allows companies to set prices to better capture value (Porter, Heppelmann, 2014). When products are embedded with sensors, companies can track the movements of the product. This behavioral data allows companies to base prices on how customers interact with the product (Chui, Löffler, Roberts, 2010). For example, insurance companies can customize pricing of policies to the actual risk of operating the vehicle and in retailing, sensors that note shopper's profile data can be used to close purchases by offering discount at the point of sale. In addition, smart connected products allow firms to reduce their dependency on distribution or service partners, and increase production and sales efficiency. Also, the benefits of continuous engineering processes will lead to a decrease in costs of internal processes. Thereby, firms can capture more profit (Porter, Heppelmann, 2014) and have more space within their profit margins to apply dynamic pricing strategies.

Dynamic pricing strategies have been a research topic for some time, starting in 2002 with Amazon testing dynamic pricing on DVDs. In 2005, a provocative study from the University of Pennsylvania showed that about 70% of the respondents had no idea that retailers could change prices based on their customers' spending habits. By 2010, the use of cookies for dynamic pricing has become inevitable (Lowrey, 2010). Now, the Internet of Things will take pricing strategies to a whole new level. Companies are vulnerable to price pressure as smart, connected products usually have higher fixed costs due to upfront technology design and more complex product designs (Porter, Heppelmann, 2015). Due to the Internet of Things, not only the amount of available user data will increase, allowing more accurate dynamic pricing, but in addition new monetizing models are emerging. This poses the challenge to guarantee profits in other ways than selling one complete, basic product. Bonnet, Buvat and Subrahmanyam (2014) identify four distinct monetizing

models evolving in an IoT environment. Hardware premium is the most basic form, where connectivity options are added to existing or new products in the form of mobile apps, enabling companies to charge premiums for their product. The service model converts traditional models into a service and creates a long-term relationship with the consumer, generating constant revenue streams. Not only the product, but also the IoT generated data itself poses possibilities for monetization. Data can be sold either raw or packaged in insights. However, it is questionable to what extent this monetizing model influences the price offered to the customer. The most advanced model is the so-called ecosystem building model. In this situation, ideally, organizations make money from both end customers as well as other platform users who sell, for example, services that interlink with the organization's product. Figure 3 summarizes the complexity of the models and nature of customer relationship for each of the models.

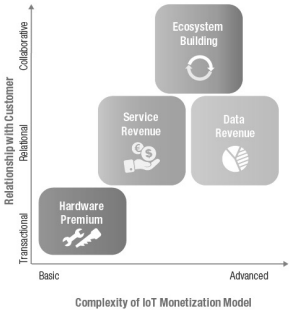

Figure 3. IoT monetization models

For each IoT monetization model, Bonnet, Buvat and Subrahmanyam (2014) introduce multiple pricing models. Hardware premium models allow for one-time charges, pay-for-results and freemium pricing models. Service and data revenue models allow for the previously mentioned models, and subscription and pay-as-you-go pricing models. Ecosystems allow for a fixed fee model, transaction based fees and a revenue share model. An example of such an ecosystems based pricing model is the so-called Power-by-the-Hour model applied by GE, where airlines pay a fee per hour of flight for the jet engines (Swartz, 2014). Through this model, buyers buy functionalities and do no longer have to forecast break downs and stock spare parts, and service providers are incentivized to perform proactive maintenance and improve product performance. Because of the differing needs of companies, there is no one-size-fits-all monetization model or pricing strategy for IoT and companies should determine the best individual strategy for their company based on company goals and product characteristics.

In an IoT world, companies are not the only party who have access to a lot more information about their customers. Likewise, the customer himself has access to a lot more information. By empowering themselves through gathering information on specific products, they will understand true product performance. Through this high information access, buying power increases and customers can pit the manufacturers against one another (Porter, Heppelmann, 2015). They will no longer be mislead by advertisements or hidden knowledge, because the customer is able to gather all required information himself. This information includes the comparison of prices from competitors or substitute products. Therefore, the Internet of Things challenges marketers to monitor the prices offered by competing companies and substitutes to guarantee their own revenue and make sure that the customer is willing to pay the offered price.

2.2.3 Place

One of the areas of application of the Internet of Things is in the domain of logistics and transportation. There will be an enhancement in supply chain management by intelligently connecting people, processes, data and things via devices and sensors. One area in which IoT will play a prominent role is in-transit visibility (Shankar, 2016). Cloud-based GPS and Radio Frequency Identification (RFID) technologies are key to in-transit visibility. RFID allows real-time information processing of every movement in the supply chain (Atzori, Iera, Morabito, 2010). This development allows organizations to optimize distribution channels in a way that inventory will always be at the right place, at the right time and in the right amount. Automatic ordering and systems could be created will, in their turn, activate automated transportation processes that will exactly predict the time of arrival. With this, customers can be targeted more specifically since the response time of companies to customer demands shortens significantly. Also, it will enhance customer service since tracking and tracing of products allows the customer to know the exact whereabouts and conditions of their packages at all times. In addition, this will allow companies to create more revenue due to a relatively short time between determining a specific customer need and replying to it. Moreover, the optimization and automation of inventory and transportation processes will reduce costs and allow companies to capture more profit. Integration of IoT into supply chain management not only allows for process automation, but also allows for monitoring of important details like temperature control, traffic conditions and driver-specific data, which are all possible influencers of product quality.

Optimization of distribution channels is a challenge every marketer is familiar with. Getting the product to the right customer is key in determining a product's success, because without reaching the right people, a product will ultimately fail. The Internet of Things allows marketers to segment and target customers more specifically. Smart, connected products generate data that can be translated to gain insights into how products create value for customers, allowing better positioning of offerings (Porter, Heppelmann, 2014). Customer segmentation and targeting allow the marketer to determine the place where the product should be distributed for both online and physical selling places to much greater detail. This will increase the success ratio of new products and will increase revenue on existing products.

Gray and Vander Wal (2012) created a simplified manufacturer's traditional value chain (Figure 4) where the relationship with the customer terminates at the warehouse, or at the very latest, at the point of sale.

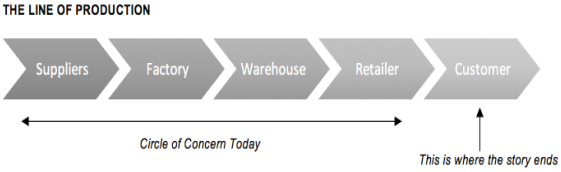

Figure 4. Manufacturer's value chain

However, the Internet of Things will change this perspective significantly. Daugherty, Banerjee, Negm and Alter (2014) argue that once industries become digital, they also become digitally contestable. The linear approach that Gray and Vander Wal describe does not apply to an IoT world anymore. Suppliers and manufacturers are now targeting customers with connected devices and services. This phenomenon creates channel conflicts: the product, the service or both elements together are now supplied through multiple channels (Bosch, 2014). Instead of linear distribution channels, the rise of the Internet of Things will generate entire distribution networks. In addition to the digitalization of companies and the access to multiple distribution channels for their traditional product, they will now also be able to offer additional services and product features through online channels. Also, the same product will no longer just be distributed by the original retailers, but will also be offered through direct online sales, via partners and even through previously unrelated companies.

Concluding, the application of the Internet of Things will not only change current logistics and distribution channels, but will also open up many more, resulting in complicated distribution networks.

2.2.4 Promotion

Personalization and purpose are key for brands to win consumer affection in this digital age (Accenture, 2015). Knowing how customers actually use products enhances a company's ability to segment customers and allow companies to develop much closer customer relationships (Porter & Heppelmann, 2014). Through IoT-generated data, the customer can be targeted with personalized campaigns that allow for a sense of understanding and interest from the organization towards the customer. For example, marketers can promote products based on tracking the current location of the customer or closely monitoring customers' spending patterns. An example of using the Internet of Things for generating personalized campaigns based on customer location are Apple's iBeacons and Estimote's Beacons (iCulture, 2016). They use new Bluetooth Smart technology supported by all major mobile platforms. By broadcasting information to all compatible devices in range, mobile phones will receive information about the products the owner of the phone might be interested in. Photos, videos, reviews, personalized pricing and social media updates are offered through this technology. It is detailed to such a high degree where the customer can be followed through a story and information on the product that is closest to the customer is being displayed, strongly enhancing in-store experience. So, there lies a possibility for marketers in the promotion area to increase customer brand engagement and generate highly customized campaigns. However, if the campaigns contain too much and/or (too) highly detailed personal information, the customer's trust might be damaged resulting in reluctance to the product.

As mentioned in the product section, a major challenge in the acceptance of the Internet of Things is the perceived privacy and security issue. People will resist the Internet of Things and smart, connected products as long as there is no public confidence that it will not cause serious threats to privacy. Even more, the IoT is extremely vulnerable to security attacks (Atzori, Iera, Morabito, 2010). The privacy and security issue is an important element that can be either overcome or strengthened through promotion strategies.

Ensuring the security, reliability, resilience, and stability of Internet applications and services is critical to promoting trust and use of the Internet (Rose, Eldridge, Chapin, 2015). The most important task for the marketer in the promotion area, therefore, lies in building a relationship of trust with the customer. This relationship is required to be build from two different perspectives:

1) The advertising campaigns should take away the customer's fear of misuse of information and lack of security measures in smart, connected products. The advertisements should clearly portray a message of safety, that is able to take away the customer's doubt about using the product for security reasons. This can either be through the atmosphere and the way the product is presented, or by explicitly referring to the measures that have been taken to guarantee the safeguarding of information.

2) The customer should not feel threatened or watched by the amount of personal information exposed via advertising campaigns when companies target customers personally. The Internet of Things allows the marketer on the one hand to target customers specifically and enhance customer experience, but on the other hand challenges the marketer to balance the amount of information used for targeting that might be perceived as being sensitive and raises privacy concerns.

As well as in the product development area, in the promotion area there is a need for new and enhanced skills of the marketer. Where originally the creative and artistic mind of the marketer was of high importance, science has now won the battle between art and science (Armstrong, 2015). Creativity, of course, does still matter, but technology and digital engagement have now become the top areas in which marketers are expected to develop skills. Translated to the application of the Internet of Things, this means that marketers are focused on creating the ability to take the customer's point of view and become the customer's advocate. For example, by using technology to understand customer behavior, the marketer is able to target the customer more accurately and directly. There is a lower focus on exploiting artistic talent for unique advertisements, and a higher focus on increasing the understanding of customer behavior and creating more efficient marketing campaigns through multiple channels. The ability to both serve and observe the customer 24/7 to understand customer needs and deliver them what they want at the right time and in an attractive way requires an intensive usage of customer data gathered through the Internet of Things.

In summary, according to existing literature, the use of IoT will shed a new light on the nature of products and product development through new product functionalities and highly increased access to information. Also, as the nature of products changes, new pricing models will emerge and flexible pricing strategies can be put in place. Product distribution systems will be optimized through RFID and cloud-based GPS and complicated distribution networks will emerge. Last but not least, promotional strategies can now be optimized to the degree where customers are individually tracked, monitored and targeted. However, the possibilities that the application and integration of IoT brings for marketing practice do not go without accompanying risks such as the privacy and security of data generated by IoT based products, the requirement of investment in new skills and capabilities, and the complexity of the products and IoT-generated data.

3. FIELD EXPERIENCES

This field experience study serves to examine to what extent the studied companies apply strategies to deal with the challenges and how they create value from the possibilities the Internet of Things brings to the marketing practice as identified in the literature. The purpose of this study is to understand whether the possible challenges and possibilities identified in the literature are experienced as such in practice, and what strategies are applied by the companies under study to deal with these challenges and possibilities.

3.1 Data Gathering

3.1.1 Sample

According to Armstrong (2015), over 80% of marketers agreed that the structure and design of marketing needs drastic changes to meet the company needs over the next three to five years. In addition, GE and Accenture conducted a research on the top three fears of companies when they are unable to implement a Big Data strategy in the next one to three years. The fear of competitors gaining market share at their expense (66%), the fear of investors losing confidence in the ability to effectively grow business (61%), and the fear of losing competitiveness on pricing (52%) make up the top three of fears, suggesting the recognition of the importance of this topic. The statement that the structure and design of marketing requires change cuts across all company groups: small companies, large companies, B2B and B2C. In addition, Armstrong (2015) identifies the Internet of Things as one of the trends that will be of major influence on this change. Literature implies that Europe is leading in adopting the Internet of Things into business. According to Witchalls and Chambers (2013), 34% of European companies will make an under 10% year-to-year increase in investment in IoT and 31% is planning to increase over 10% of the budget on a year-to-year basis that is being spend on IoT investment. Also, the business index scores that indicate the stage at which IoT is being used by businesses on a global, regional and industry level are the highest for Europe for use in both internal operations and processes (4.39) and external products and services (3.92). The score of 3.92 for external products and services places businesses at the top end of the "in research" stage and the score of 4.39 for internal operations and processes places business in the transition between the "in research" stage and the "in planning" stage. This leading attitude in adopting the Internet of Things in businesses is reflected by several events that are organized in Europe to promote the Internet of Things and the accompanying business opportunities, such as the Connecting the EDGE event by IDTechEx, the IoT Tech Expo Event in Berlin and the Connected Conference 2016 in Paris. Because of the leading position of Europe in IoT adoption, the sample for the interviews of this field experience study will consist of five European companies that are familiar with the modern technologies and Internet-of-Things-generated data. The sample for the survey is complemented with additional European companies. Based on the findings of Armstrong (2015), there will be no differentiation between small and large companies or B2B and B2C oriented companies on forehand. Different types of employees involved in the marketing practice were interviewed to achieve diversity and different perspectives in the answers:

Interviewee 1	Customer Journey Manager at Eneco
Interviewee 2	Vice President Strategic Account Management at Teleperformance
Interviewee 3	Director Operations at Green Choice
Interviewee 4	Senior Manager Customer Care at a sound system company
Interviewee 5	Technical Product Manager Internet of Things at KPN

3.1.2 Method

The companies are evaluated based on a short survey for general background information and a semi-structured interview with an employee that has knowledge of the marketing practice of the company. Surveys are used for identifying the subjective feelings of the people under study, and to understand attitudes and opinions towards a certain topic (Fowler, 2013). Interviews help to provide a deeper knowledge of the matter concerned (Gill et al., 2008). This field experience study includes a semi-structured interview that consists of several key questions that help to define the areas to be explored, but also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail (Britten, 1999). Because of the desire for a detailed understanding of the topic, interviewing was the research method of choice (McIntyre, 2012). The information the interviewees provided is confidential to the extent that some of the interviewees preferred the interview to be transcribed anonymously (i.e. with no direct leads to company names and figures). The application and integration of the Internet of Things in the companies is measured according to an adjusted version of the Internet of Things business index introduced by Witchalls and Chambers in the Economist (2013).

The Internet of Things business index is based on an online survey conducted by The Economist Intelligence Unit in June 2013. This study uses a variation of the initial IoT business index, where the conclusions are generated from the responses to the survey questions, and the sub-questions and conversation following from the four guiding questions in the semi-structured interview:

- *To what extent is your organization using, or planning to use, the IoT in its products or services?*
- *To what extent is your organization using, or planning to use, the IoT in its pricing strategies?*
- *To what extent is your organization using, or planning to use, the IoT in its product distribution?*
- *To what extent is your organization using, or planning to use, the IoT in its promotional strategies?*

Based on the responses to the survey questions, the general attitude towards IoT and the expected impact of it is tested. Based on the semi-structured interview, it is determined whether a specific IoT related opportunity or challenge identified in the literature is identified as such by the interviewees. The degree to which companies are already implementing these identified opportunities and challenges is determined as well and is based on the answers to the semi-structured interview. The responses to

the semi-structured interview's (sub-)questions are converted to scores on a 1-10 scale and grouped into 5 categories by the interviewer, where:

1-2 = non-existent (or virtually non-existent)

3-4 = in research

5-6 = in planning

7-8 = early implementation

9-10 = extensive application

Scores lying between these levels (for example, 2.5) indicate that businesses in the relevant sample or sub-sample are transitioning from one stage to another.

The appendix includes the survey questions and an overview of the framework used for the semi-structured interview. The transcriptions of the interviews are available on request.

3.2 Results

This section covers the results from the field experience study, starting off with the results from the survey, followed by an overview of IoT application for marketing practice within each company under study.

3.2.1 Survey

The section summarizes the most remarkable results from the survey. Full results of the survey can be found in Appendix 1.

The survey showed that the responding companies were all operating in Western Europe and most of them (63%) had a global revenue of € 50 million or more.

The general attitude towards IoT is that it will have a significant impact on business in general. 64% of the respondents believes it will have a major impact in most markets and industries and 36% believes it will have some impact but its scope will be limited to a few markets or industries. To remain competitive, 60% strongly agreed and 40% somewhat agreed that companies should not be slow on IoT integration.

Due to IoT, respondents expect their existing business model and strategy to change (29%) and new revenue opportunities from existing products and services will be unlocked (24%). The biggest positive changes are expected in the area of products and services (36%), data management and analysis (23%) and customer service and support (18%). The steps that will be taken and the size of financial investment to achieve these results are widely dispersed. All respondents expect to use IoT in its business within the coming three years, but the extend of integration varies.

The obstacles towards integration of IoT in business processes are considered to be both internal: lack of employee skills and knowledge (19%), and external: undeveloped consumer awareness (24%) and immature industry standards around IoT (14%).

3.2.2 Interviews

Eneco

Eneco is an integrated energy group of several complementary business units. They offer energy security to over two million customers. Also, they provide total solutions to become fully sustainable. Their company mission, therefore, is to provide sustainable energy for all. All customers will eventually use home-grown renewable energy, making them independent and saving them a lot of money. Eneco employs over 4,000 people from their sustainable headquarters in Rotterdam, the Netherlands: Eneco World.

Around 2.5 years ago, Eneco introduced a smart, connected thermostat called *Toon*. This product is connected to the Internet, a software application and other devices, such as smoke sensors and smart plugs with which it communicates via Z-waves. In the future, Eneco plans to expand the connecting possibilities of *Toon* by introducing, for example, camera surveillance. Before bringing these new possibilities to the market, Eneco wants to guarantee the ability to provide excellent customer service on all product areas.

The information generated from this system is used for after-sales service and personalized customer advice. The advice is not personalized to the degree of individuals yet, but Eneco does provide group-personalized advice based on IoT-generated information. Not only information coming from the direct software is used in creating advice for the customer, but also the information coming in from service centers, forums and search queries on the website is analyzed to increase customer support. In addition, the software integrated in *Toon* is made public for developers, allowing them to upgrade the application for end-users. However, for privacy reasons, the data is being kept private to Eneco. Before the introduction of this product to the market, the security and privacy of information was considered a risk. Customers have to give Eneco explicit consent for using information generated through their use of *Toon*. Advanced regulations have been installed to guarantee safety of the information, and in no single situation customer data will be sold.

In internal processes, Eneco automates all processes that can be automated, but there are no autonomous production systems put in place. They do use voice analytics to analyze incoming phone calls in order to optimize customer service, but autonomous chatbots will not be put in place.

Due to the connection of many other devices to *Toon*, markets will merge, industry boundaries will vanish and cross channel distribution will appear. The IoT, therefore, definitely changes the market in which Eneco is operating and the place in which Eneco offers its products.

Moreover, IoT-generated data changes the pricing model of Eneco in a way that customers can "pay" for the electricity and gas they use by delivering home-generated energy to Eneco in return. Also, the payment of electricity and gas is shifting from fixed pricing models to subscription models.

Besides targeting already existing customer segments, Eneco will use IoT-generated data to segment and target customers more specifically. For example, the use of the website will be analyzed to guarantee high responsiveness to customer needs.

The channels and messages for promotion strategies are specified and optimized based on IoT-generated customer data as well. Both content and time and place of promotion are considered carefully. Also, Eneco ensures transparency about the use of *Toon* to build a relationship of trust with the customer to prevent reluctance to use this smart, connected device.

Based on this interview, Eneco identifies many of the challenges and possibilities of IoT application identified in

literature for practice as well. In the product element, they use IoT extensively (9). For pricing strategies, the first steps have been taken and the pricing model in particular underwent significant changes, placing them in the end of the early implementation phase (8). The influence of IoT on customer segmentation and targeting is limited to group-level targeting, so therefore in the early implementation stage (7). For promotional strategies, IoT is used to build customer relationships on group level as well, but involves many different channels and customized messages, placing them at the end of the early implementation phase (8).

Teleperformance

Teleperformance is the world's leader in outsourced omnichannel customer experience management. They connect the biggest, most respected brands with their customers by providing customer care, technical support, customer acquisition, technical solutions, analytics, back-office and other specialized services to ensure consistently positive customer interactions. Teleperformance operates in more than 160 markets worldwide employing 190,000 people in 311 sites from 65 countries in 75 different languages.

Teleperformance operates in a business-to-business context. Whereas in health care and electronics B2C industries IoT is already of significant influence, the B2B industry in which Teleperformance is operating is moving in a slower pace when it comes to application of IoT. However, IoT is definitely considered to be relevant for electronic and service-related companies in both B2B and B2C industries. The so-called killer app in B2B industries is yet to come, but Teleperformance will closely monitor industry developments to act upon them.

Teleperformance believes that the main challenge for adoption of IoT is the security and privacy of data. Also, the complexity of generated data is considered a challenge in making IoT valuable to a company. Staff is trained to develop skills and capabilities to manage the complexity of IoT application.

Even though IoT is not (yet) directly implemented into the service of Teleperformance, the use of IoT in smart, connected products in general will definitely influence the service Teleperformance will deliver to customers in the future. For example, the complexity of IoT based products will raise questions on end-user level to which Teleperformance should respond.

Eventually, Teleperformance expects the need for a changing business model and additional services, that will ultimately result in higher revenues. The service itself will not change in its nature, but through IoT application, Teleperformance will be able to create a more proactive approach of customers and highlight accurate customer segmentation and targeting.

Teleperformance is planning to use IoT to enhance its delivered services when the killer app has been found, placing them at the end of the in planning phase (6). For pricing strategies, IoT influence virtually non-existent (2) at this point in time. However, for customer segmentation and proactive approaches, Teleperformance is planning to use IoT (6). For promotional strategies, IoT has not reached beyond the research stage (4) yet.

Green Choice

Green Choice is a relatively young energy company, founded in 2001. Their goal is to provide the Netherlands with 100% sustainable energy by making customers owner of their own energy. Ultimately, customers should generate their own energy and use energy in more efficient ways.

Green Choice works with smart, connected thermostats that provide them with a lot of IoT-generated data. To create meaningful insights from this data and deal with the complexity of this phenomenon, they are expanding their technical skills and capabilities. In addition, they will start a Big Data project to see what possibilities this data generates for the company. Among these possibilities are enhanced after-sales service and personalized advices. Privacy and security of data is a hot topic in the energy industry and Green Choice takes every necessary precaution to safeguard data.

For internal processes, Green Choice is currently planning the implementation of IoT based devices such as machine learning.

Pricing strategies have changed in a way that IoT data is used to determine payment agreements based on customer profiles. Application of dynamic pricing based on IoT-generated data is still in the planning phase, but is definitely considered to be relevant for the energy industry Green Choice is operating in. The energy industry is subject to major changes, in which pricing models will change drastically, partially due to the introduction of IoT.

Green Choice uses IoT data extensively for customer segmentation, targeting and customer retention models. However, they believe that future development will bring many more possibilities of IoT integration for these processes.

For promotional activities, the data generated from the thermostats is being analyzed and coupled with existing customer data to deliver the right message to the right group of customers. However, they are planning to take the creation of personalized campaigns to existing customers to a higher level in the near future. Also, campaigns will be used to highlight the advantages of using the IoT-based smart, connected thermostats to potential customers.

In its products and additional services, Green Choice uses IoT already extensively (9), but there is still room for improvement. Whereas IoT-generated data is already used for payment agreements, the actual dynamic pricing of products is still in the planning phase (6). For the place element of the marketing mix, Green Choice uses IoT-generated data, but considers itself to be in the early implementation phase (8). Promotional activities are already enhanced through the use of IoT, but full personalization of these campaigns is still in the planning phase (7).

Sound system company

This company, operating in 50 countries worldwide with thousands of stores, is one of world's biggest providers of sound systems and home cinema sets. This company is an excellent builder of fully integrated sound systems, focusing on the optimization of customer experience.

This company uses IoT in its products to the extent that music can be spread wirelessly via software integrations with the sound system. The main goal of the company is to differentiate based on customer experience. This experience starts at the so-called out-of-the-box experience and develops all the way until the actual playing of music. For this purpose, IoT and the data it generates is used. In addition, the data that is created from

the applications is used for customer care. For example, when a problem occurs, customers can send a diagnostic report to the company. From there on, they can easily locate the problem and provide the customer with a solution. Also, the app is used for direct customer feedback to allow the company to improve its products; or user innovation.

The pricing model of this company has not changed due to IoT, because the software is supplied with the product and customers still buy a complete package. Moreover, this company does not differentiate through pricing strategies, so IoT will not be relevant in this element for creating dynamic pricing strategies.

IoT-generated data is used for customer segmentation and closing the consumer knowledge gap in order to target the product to the right customer. Also, based on the available information, the company might be able to identify new customer segments.

In promoting their products, this company established customized campaigns on a regional level based on, among other sources, IoT-generated data. Campaigns have not been personalized to the degree of individuals.

Based on these results, the product element of this company can be placed at the end of the early implementation phase of IoT application (8). For pricing strategies, IoT is not considered relevant, so the application of IoT for this element is virtually non-existent (2). Since customer segments are identified and targeted through the use of IoT, the company finds itself in the early implementation phase (7) for the place element of the 4P model. For promotional strategies, campaigns are customized, but so far only on regional level. Therefore, the company is in the early implementation phase (7).

KPN

KPN is a globally operating leading supplier of ICT services. In the Netherlands it is the biggest provider of telecommunications and IT services. They serve a large number of diverse customers with a wide range of products and services from prepaid call services to interactive HD television.

KPN is a well-known provider of networks. To enhance these networks, KPN focusses on Machine-to-Machine learning through SIM cards and the application of LoRa technology. Based on the capabilities of KPN and the possibilities of IoT, KPN offers its customers assistance in exploring the possibilities of IoT for their business. Afterwards, they assist customers in integrating IoT in their business by providing network possibilities. This all takes place in a B2B context, where KPN has no contact with the end user of the smart, connected product. For B2C purposes, KPN introduced Smart Life.

KPN does not experience reluctance of customers towards the application of IoT based on privacy and security concerns, because the customer itself is owner of the data and KPN has no access to this. However, application of IoT requests for a full network of integrations that requires major investments to be fully installed.

For B2B purposes, the IoT application is purely sold as a product and is not used for internal process optimization, or determining of price, place and promotional strategies.

In product development, KPN has already come to the point where IoT has turned into a product itself. Therefore, it is placed in the extensive implementation phase (9). However, in pricing (2), determination of place (2), and promotional activities (2) the use of IoT-generated data is virtually non-existent in the B2B activities of KPN.

In summary, the examined cases agree on the vision that IoT is expected to have a significant impact on business in general. However, the way and extent to which measures have been taken to apply and integrate the Internet of Things in existing business differs. Based on this sample, the companies operating in a B2C market are further along the process of integrating IoT into their products and business operations. The companies operating in a B2B context have recognized the importance of IoT, but are waiting for the killer-app before integrating IoT into their own products or services and/ or using IoT generated-data for marketing purposes. The privacy and security issue is again considered as a risk of applying IoT, as well as the attraction of skills and capabilities, immaturity of industry standards and unawareness of consumers around the topic of IoT.

4. DISCUSSION

Based upon literature, there are many possibilities as well as challenges arising from the IoT world we are living in for future marketing practice. Within the framework of the 4P marketing mix, this means a change in the way products work and a shift from purely physical products to additional related, interconnected services. IoT will generate data that, if translated properly, will help to close the consumer knowledge gap and provide the ability for real-time user-based innovation. Also, internal processes can be optimized through the use of IoT. Challenges in the product area are privacy and security issues for which mechanisms should be installed and the attraction of new skills and capabilities to manage the complexity that IoT brings. For pricing purposes, the IoT helps to capture value more precisely and allows for dynamic pricing. Also, through the application of IoT, new monetizing and pricing models emerge. The empowerment of customers through the highly accessible information about competition and substitute products is a challenge marketers have to deal with. The place element of the 4P model will be subject to changes as well. Cloud-based GPS and RFID-automated ordering and distribution allows for a better and faster response to customer needs. Also, the determination and establishment of distribution channels will be brought to a higher level through the introduction of IoT. Marketers can enhance promotion through the application of IoT by personalization, enhancing customer experience and building customer relationships. Promotion can either weaken or strengthen the sense of safety, so marketers should manage this carefully. Also, there is a shift from art to science in marketers' required capabilities identified.

As shown by the empirical findings, technical companies involved in B2C marketing are already applying IoT for marketing purposes quite extensively. The companies under study scored far above European average on the application and integration of IoT into their products and services on nearly all elements of the 4P model. A lot of possibilities and challenges as identified in the literature were also considered as such in practice by the companies involved in B2C marketing. For B2B marketing, IoT application and integration seemed less vital to company success, but they definitely act upon IoT developments in general. Moreover, IoT application is even sold as a

product itself. Also, possibilities for integration and application of IoT from literature were not always considered relevant for a B2B industry. Even more, all companies in this study indicated the significant influence they expect the Internet of Things to have on business. However, I doubt whether most companies in today's technology-driven world are able to translate the integration of IoT into valuable application for marketing practice due to the complexity of the generated data and the required investments in skills and capabilities.

Whereas existing literature does not clearly distinguish between different types of companies, the empirical findings showed a clear difference in the ways and extent to which companies operating in different markets apply and integrate the Internet of Things. At this point in time, companies use the Internet of Things into their physical products and provide complementary services based on the generated data from the products. Also, they already use IoT-generated data for promotional purposes to some extent, but have not established personalized campaigns to the degree of individuals yet. According to literature, there are many more possibilities than the ones that have yet been implemented by the studied companies, but the complexity and required investments to be made are still holding back companies to fully exploit the opportunities of IoT.

Both literature and the studied companies that have integrated IoT mentioned the changing business environment as a key driver for the integration and application of IoT to remain compatible. Industries are changing and companies have to distinguish from competition based on more than their traditional product alone. Customer service and customer experience are considered to be climbing up the ladder of importance to company success. Whereas this research is structured along the traditional 4P model, associated with the Goods-Dominant-Logic, results from both literature and field experience imply that IoT may strongly contribute to the field of Service-Dominant-Logic (Vargo, Lusch, 2004) as well. IoT does not only contribute to the exchange of tangible resources, but also offers enormous possibilities for the exchange of intangible resources, co-creation of value and building relationships. Application of IoT contributes to enhancing the foundational premises as suggested by Vargo and Lusch (2004). For example, this research showed that IoT-generated data and connected products allow for customization of offerings, recognition of the customer as a co-producer, and involvement of the customer in the customization process, all conform the service-centered view. Application of IoT may eventually contribute to the shift from exchange of goods, to the exchange of application of competences, or specialized human knowledge and skills, as suggested by Vargo and Lusch (2004).

5. CONCLUSION

Based on existing literature, the Internet of Things is a phenomenon that is expected to have a huge impact in the way companies do business and marketing strategies should be established based on this changing environment. However, based on statistics and the empirical findings of this research, there are only a few companies who have integrated and applied the Internet of Things extensively for marketing practice at this point in time and it is questionable whether all players in a market will eventually be capable to exploit the opportunities this technology offers for marketing purposes. Even though most companies plan to integrate IoT into their business, the limiting factors at this point are the lack of capabilities and skills to deal with the complexity of IoT-based systems, requiring large investments, and immaturity of consumer awareness and industry standards.

Limitations and implications for further research

Firstly, a limitation of this research is the limited amount of research conducted on this topic due to the newness of the Internet of Things. Therefore, results might be relatively general and many more possibilities and challenges for the marketing practice may rise in the (near) future. Only time and future research will tell if this is the case.

Secondly, even though the field experience study involves more cases than initially planned, the number of studied cases is still too small to generalize findings. To ensure the validity of the outcomes of this research and make them applicable to economy in general, the field experience study should be repeated with a much larger sample.

The Internet of Things will require businesses to change in many different aspects. For the marketing area, the growing fusion of the roles of Chief Marketing Officer (CMO) and Chief Information Officer (CIO), traditionally charged with IT operations, is one of them. All IoT-generated data should be translated into meaningful insights to make it valuable for the marketing practice as IoT is rather about enhancing customer experience and enabling them to achieve the best possible value than about visual brand consistency. Another change that the IoT world requires is the attraction of new resources and skills. A highly technical environment requests for data analysts, employees who manage the technology for each company process and people who can manage a fast-changing environment. Because of the magnitude of this challenge and its impact on current business, further research should be conducted on an additional P, besides the 4Ps addressed in this research, namely: *personnel*.

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8. APPENDIX

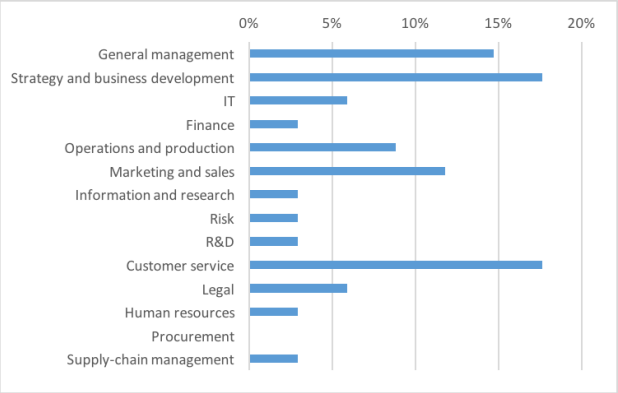
SURVEY

Background Information

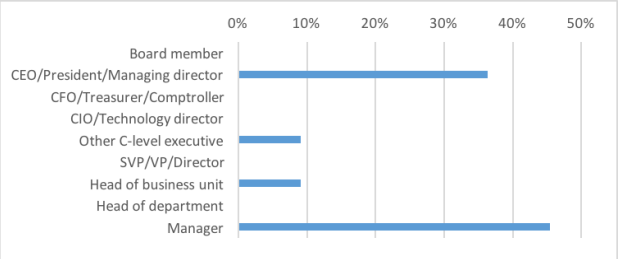
Guiding Text:

"The following questions are a set of general questions serving to provide the researcher with general background information on the interviewee under study. Please select the most suitable answer for you."

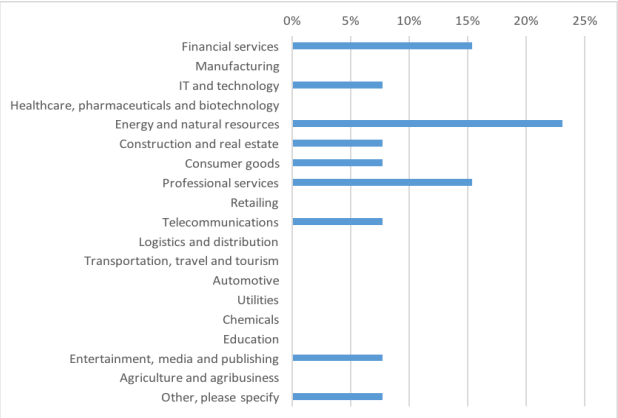
What are your main functional roles? Select all that apply.



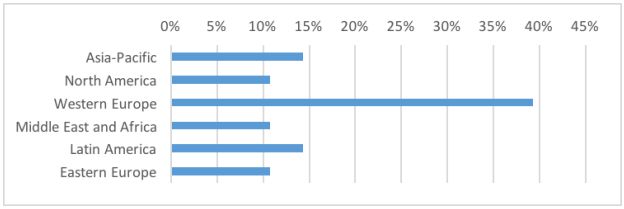
Which of the following best describes your title?



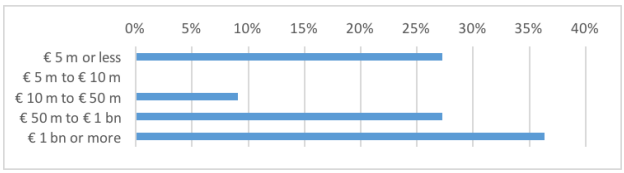
What is the primary industry your organization is in?



In which region is your business operating?



What is your organization's annual global revenue in €? Please select the most appropriate option if your company does not report revenue in €.

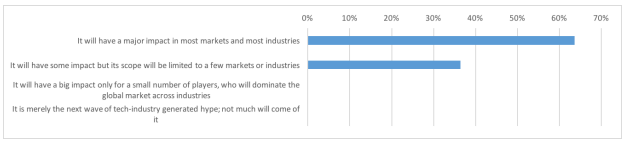


IoT – General

Guiding Text:

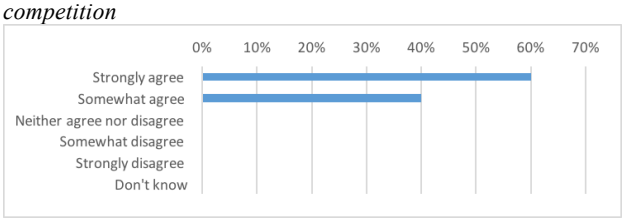
"The following questions are about the impact of the Internet of Things on business in general. Please select the answer that fits your opinion best."

What impact is the IoT likely to have on business in general over the next three years? Select one of the following statements, which best characterizes your view.

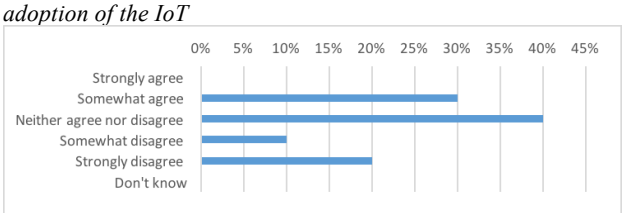


To what extent do you agree or disagree with the following?

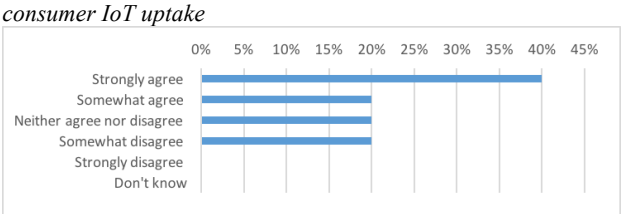
Companies slow to integrate the IoT will fall behind the competition



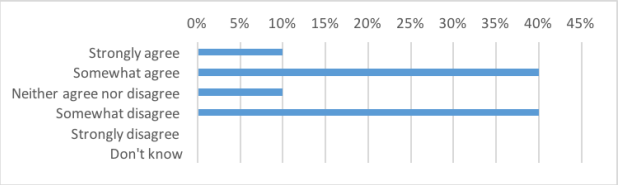
Governments aren't doing enough to promote development and adoption of the IoT



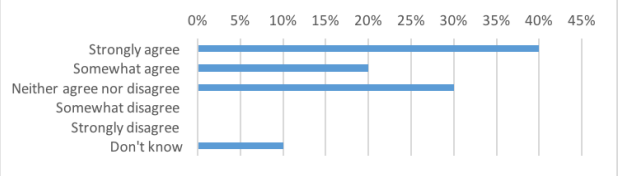
Lack of trust and concerns about data privacy are hampering consumer IoT uptake



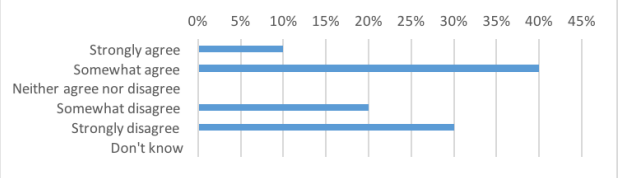
Low levels of consumer awareness about the IoT is depressing demand for IoT products/services



Adopting the IoT will make my company more environmentally friendly



My company will struggle to manage and analyze the data flowing from IoT networks

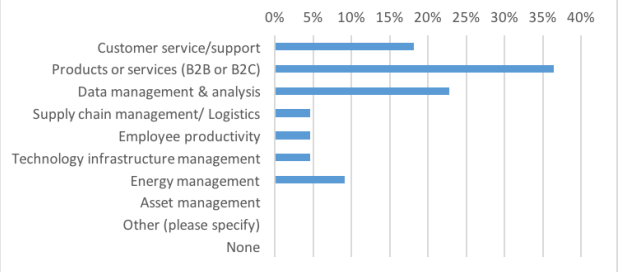


IoT – Company Specific

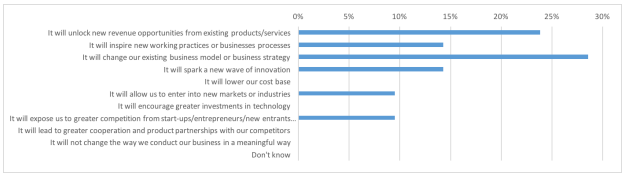
Guiding Text:

"The following questions are about the impact of the Internet of Things on your business in particular. Please select the answer that fits your opinion best."

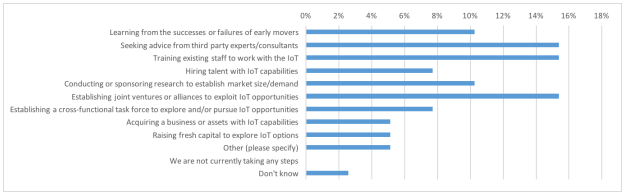
Which parts of your business are likely to see the biggest positive change from the application of IoT over the next three years? Select up to two.



In what ways do you think the IoT is most likely to change how your organization conducts its business over the next three years? Select up to two.

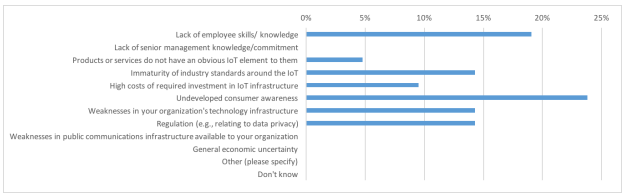


What steps is your organization taking, or planning to take, to use the IoT more extensively in the business (either in products/services or internal operations)? Select all that apply.

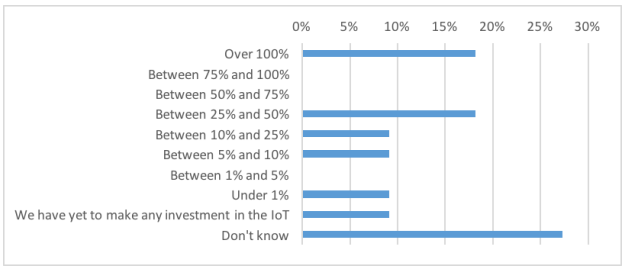


Three years from now, how relevant do you expect the IoT to be to your overall organization?

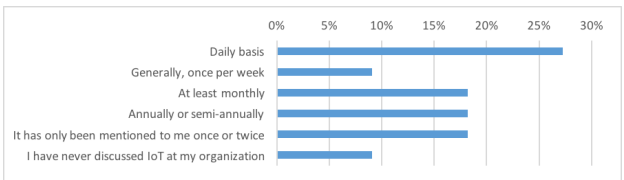
What are the chief obstacles to your organization using the IoT? Select up to two.



By approximately what percentage has your organization increased its investment in the IoT this year compared to last year?



Roughly how often are you involved in a formal conversation or structured meeting about the IoT at your organization?



SEMI-STRUCTURED INTERVIEW

- To what extent is your organization using, or planning to use, the IoT in its products or services?
  - To what extent is IoT used for incorporated features of the product or service itself?
  - To what extent is IoT used for providing additional aspects to the product or service, such as after-sale service?
  - To what extent is IoT used in the production and development process of products or services?

- To what extent is your organization using, or planning to use, the IoT in its pricing strategies?
  - To what extent is IoT used for optimizing business processes and enhancing profit margins?
  - To what extent is IoT used for creating flexible pricing strategies?
  - To what extent has IoT changed the pricing model of your organization?

- To what extent is your organization using, or planning to use, the IoT in its product distribution?
  - To what extent is IoT used for customer segmentation and targeting?
  - To what extent is IoT used in the ordering/ distribution process of your products or services?

- To what extent is your organization using, or planning to use, the IoT in its promotional strategies?
  - To what extent is IoT used for creating dynamic marketing campaigns, e-mail campaigns, etc.?
  - To what extent are campaigns used to build customer relationships through IoT?