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The Internet of Things – Chance and challenge in industrial business relationships

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1. Introduction

The term 'Internet-of-Things (IoT)' was first introduced by Ashton (2009) to describe how IoT can be created by "adding radiofrequency identification and other sensors to everyday objects". Today, the term IoT is used for a network of entities that are connected through any form of sensor, enabling these entities to be located, identified, and even operated upon without any human interference. The focus of the IoT also opens new business and market opportunities (Miorandi, Sicari, De Pellegrini, & Chlamtac, 2012). Manufacturers are focusing on the IoT data transfer to improve machine efficiency and save maintenance costs. Finally, distributed data technology and innovative hardware such as social networks, cloud computing and smart devices form an extensive network that supports IoT activities and data sharing in Business-to-Business (B-to-B) marketing (Atzori, Iera, & Morabito, 2010; Da Xu, He, & Li, 2014).

Having the opportunity of sharing digital data, IoT technologies enhance buyer–seller interactions and touchpoints; this benefits companies that acknowledge the importance of creating and maintaining digital relationships with their customers (Kannan & Hongshuang, 2016). Questions of whether—and, if yes, how—the IoT impacts business networks in the field of B-to-B relationships have not yet been settled, due to a lack of empirical marketing-focused studies. In a recent discussion on how companies can adopt new digital technologies early to provide additional value to customers, Kannan and Hongshuang (2016, p. 19) argue that "the value delivered to customers depends on the provision of reliable and superior service using the technology."

Atzori et al. (2010) and Atzori, Iera, Morabito, and Nitti (2012) claim that cooperating with peers to achieve common goals, interacting with their objects, and providing information in real time through standard communication protocols is a relevant contribution from the IoT to relationship building and maintenance. Nevertheless, with reference to opportunities for networked products in the context of the IoT, it is unclear what international customers perceive as "additional value." Is it true that by using the IoT technologies, manufacturers and buyers are perceived as peers cooperating to achieve common goals? Is "connectivity for anything" (Atzori et al., 2010) really a common relationship goal, focusing on "social networking principles" (Atzori et al., 2012)?

In general, disruptions caused by new technologies may raise a buyer's concern about whether the original relationship conditions are still valid and can be relied upon (Chen & Zhuang, 2011). Although the IoT has had a substantial impact on product development and marketing communication, as well as on networking strategies; this disruptive, new technology substantially interferes in B-to-B buyer–manufacturer relationship quality. New sales management and marketing communication challenges in this context are related to the data transfer between machines, unclear data ownership and new IoT-based service and maintenance offerings.

In this paper, we discuss the IoT using the example of a network embedding a German manufacturer of mechanical engineering products together with its existing and future international customers. Considering disruption management, we investigate customers' attitude towards IoT based product and service components in Eastern and Western Europe and China. In this study, we develop and discuss a multi-method approach to answer the following research questions:

(1) Can perceived usefulness of the IoT be explained by the Commitment-Trust Theory and technology acceptance models?
(2) Considering the concept of reciprocity in Eastern Europe, the importance of relationship trust in Western Europe and the concept of Guanxi in China - how do international organizational buyers perceive the usefulness of IoT projects?
(3) With reference to relationship marketing management, what are the chances and challenges for international managers in the light of the IoT relationship disruptions?

Based on qualitative and quantitative research data, we develop and discuss a conceptual frame of organizational networks, trust, and technology acceptance in the context of the IoT. The empirical data provide evidence of how IoT transactions affect trust in buyer–manufacturer relationships. With the help of theories and empirical observations and data, we follow the multi-method research approach described in Fig. 1.

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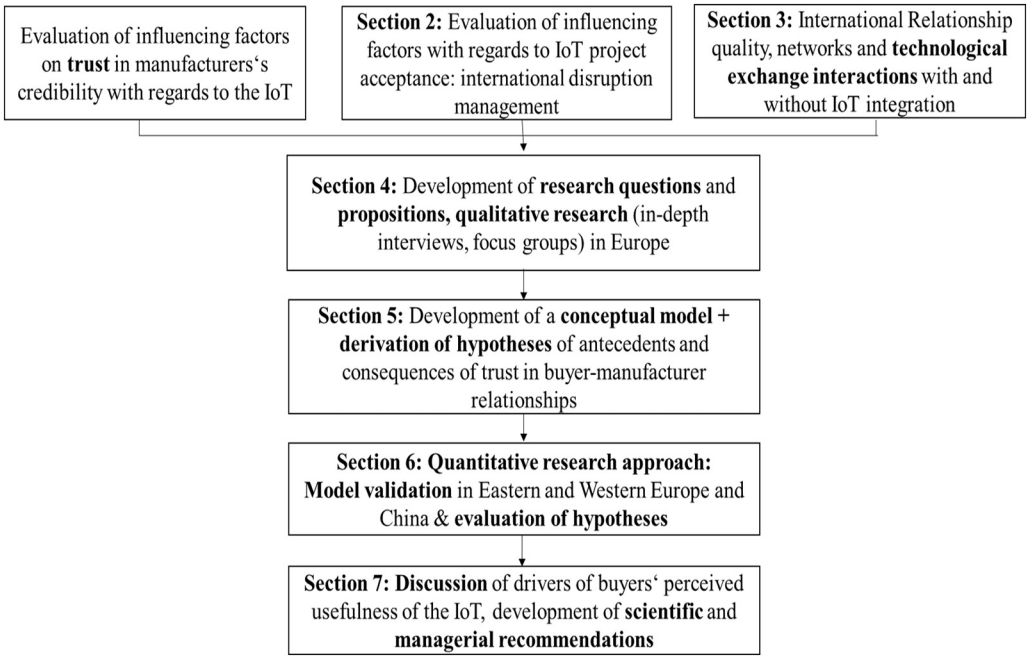

Fig. 1. Multi-method research approach.

Our paper is structured as follows: In the next section, we discuss the challenges of the IoT on relationships and focus on disruption management. In Section 3, we refer to the idea of reciprocity in stakeholder marketing, "a fundamental concept in B-to-B marketing in emerging environments such as Eastern Europe" (Berger & Zviling, 2013, p. 149). We also explore the exchange interactions of relationship quality and networks by extending the works of Medlin (2004). We highlight the underlying mechanism of relationship marketing in Western and Eastern European culture and in Chinese cultures. We refer to the Chinese relationship concept of *guanxi* by distinguishing *guanxi* from relationship marketing in terms of the personal and specific nature of the connection. In Section 4 we discuss our qualitative research approach to exchange interactions integrating the IoT. In Section 5, based on the results of our qualitative research, we propose our conceptual model of the antecedents and consequences of trust in buyer–manufacturer relationships. Section 6 presents our quantitative research study on exchange interactions integrating the IoT, our hypotheses, and our findings. Finally, our paper concludes by discussing the scientific and managerial implications, the latter focusing on international marketers who wish to succeed in the Chinese or Eastern European business market, and the importance of distinguishing Western and Eastern relationship marketing principles from *guanxi* marketing. We discuss some limitations and suggest further research directions.

2. Internet of Things and relationships: managing disruptions

Identified as one of the top strategic technologies of the future, the term "Internet of Things" today is discuss in different conceptualizations (Ng & Wakenshaw, 2017). One of the things IoT solutions are designed to do is to improve reliability through advanced monitoring applications, as well as perform real experimentation through the extensive testbeds deployed in industrial environments, which are still in their early stages (Civerchia et al., 2017). Thus, the IoT offers the opportunity to harvest real-time information from objects and interactions to suppliers. This data, exchanged between buyers and manufacturers, enable pattern analysis, anticipate changes, and monitor and confirm whether the object has achieved the desired outcome (Marquier, Lee, Jeon, Kemos, & van der Berg, 2016). Dynamic devices connected through the IoT are said to create disruption at a Schumpeterian level that is only in its early stages (Ng & Wakenshaw, 2017).

According to Schumpeter (1942, p. 82), the "gale of creative destruction" describes the "process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one". Disruption in Schumpeter's (1942) context is a creative destruction, additionally linked to technological changes and innovations. Discontinuities or continuous changes in technological innovations are associated with the emergence of a new paradigm (Dosi, 1982, p. 147). Some contexts—like the changes caused by the IoT in buyer-manufacturer relationships—seem to trouble incumbents, they are related to "scientific paradigms".

In our research, the *thing* in IoT refers to an inanimate object that utilizes digital technology, and interconnecting machines. An exchange of data between buyers and manufacturers is available quickly and conveniently, and is always automated (Balaji & Roy, 2016; Ehret & Wirtz, 2016; Prasad & Kumar, 2013). Our study concentrates on the communication-related facet of IoT: the programmability of machines that send and receive digital messages. IoT as a network platform implies that inter-connected machines can be located, identified and operated upon (Atzori et al., 2012). We focus on industrial manufacturing sites connected to the Internet.

2.1. Linking the challenges of the IoT to relationship disruption

The literature defines disruption management differently in various contexts, but most definitions share a basic set of the following attributes: a disruption (or a set of disruptions, innovations and changes), and how do deal with this disruption considering the strategic, economic and operational performance of the company (Ivanov, Sokolov, & Dolgui, 2014). Working with connected devices, e.g., by using smart glasses connected to the manufacturer or by using a machine-to-machine interface has a significant impact on product handling. Thus, considering Schumpeter's definition of creative destruction in the context of disruption, the changes caused by the IoT do not only related to the massive changes in product handling, but also to the buyer-manufacturer relationships. Data transfer is always a sensitive case – this issue needs to be considered in the context of relationship marketing.

With regards to the IoT, the significant disruption in the buyer-manufacturer relationship environment is caused by new ways of