

# The Internet of Things: Chance or Challenge in International Business Networks?

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## Abstract

Internet of Things (IoT) technologies transform production and services sectors. Our study addresses three questions: (1) How does IoT impact international buyer IoT usefulness perceptions, (2) can perceived usefulness be improved by Commitment-Trust Theory and technology acceptance models, (3) are there regional differences towards IoT's perceived usefulness? With qualitative and quantitative research, this study identifies three relationship drivers crucial to willingness to adopt IoT. We propose and empirically test a conceptual model of antecedents and consequences of trust in buyer-manufacturer networks focusing on IoT credibility. Our data enhance the findings of Medlin (2004), claiming that relationship bonds are susceptible to change from economic, social, and relational impact factors by integrating technical impact factors as drivers of relationship bonds. In IoT acceptance Asian *guanxi* -relationships and connections- is the driver and basis of business behavior. In Western Europe and Asia, trust in manufacturer data safety and data transfer is a key enabler for IoT projects. The IoT changes purchaser-manufacturer relationships — a manufacturer's IoT credibility, promulgated by honest and open communications, helps to maintain trust in relationships and networks.

**Keywords:** Internet of Things, trust, relational bonds, relationship management, relationship norms

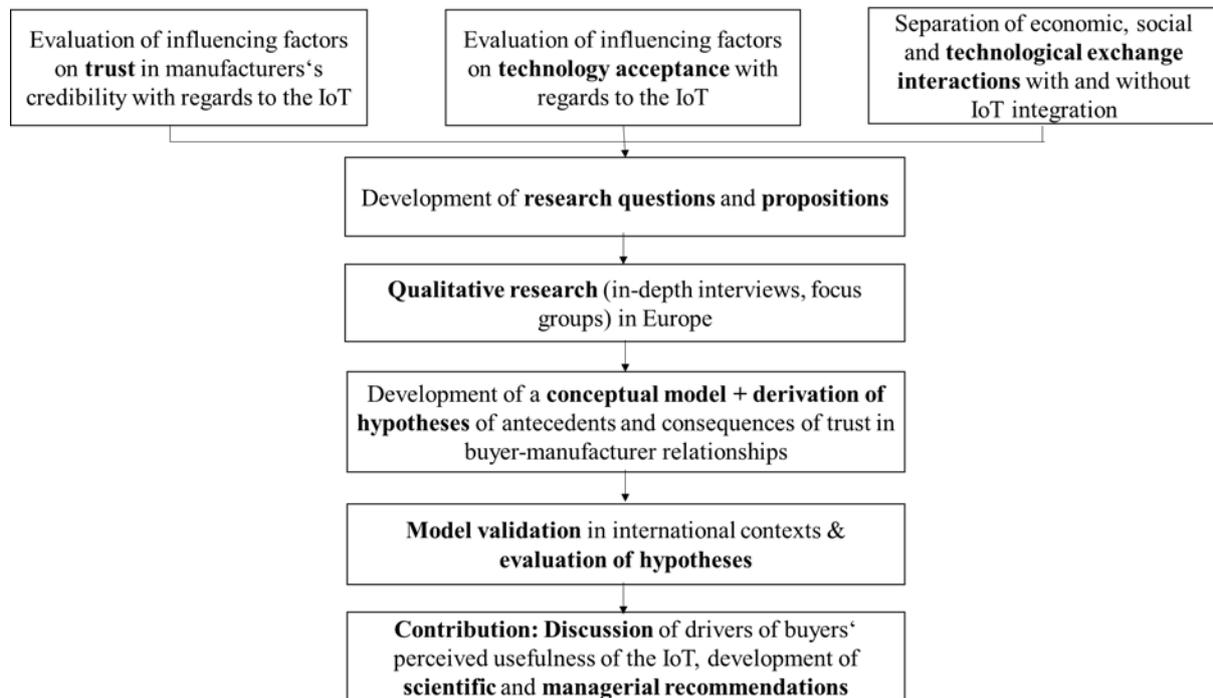
## Introduction

Internet of Things (IoT) technology implies an exchange of data between buyers and manufacturers that is available quickly and conveniently, and is always automated (Prasad & Kumar, 2013). We examine empirically how IoT buyer-manufacturer projects develop their impact on organizational networks. The latter is generally defined as a structure of interconnected formal and informal relationships, where knowledge is transferred, transactions are mediated and organizations get access to resources and power (Brass, Galaskiewicz, Greve, & Tsai, 2004). Our study refers to the formal part of relationships and includes resource, products, data and work flow exchange. The terms 'relationships' and 'networks' are widely used in academic discussions of business practices (Håkansson & Ford, 2002). Business networks are elaborate systems of exchange relationships, where companies become connected to each other over time, and where various activity links, resource ties and actor bonds emerge between companies, building interdependence and stability in an inherently dynamic system (Håkansson & Snehota, 1995). Research on business strategy refers to enhancing our understanding of how to effectively develop business organizations in their environments. Therefore, scholars focus on the organizational processes needed to enhance this effectiveness (Håkansson & Snehota, 2006).

The questions of whether— and, if yes—how the IoT impacts on business networks in the field of B-to-B relationships has not been settled yet, due to a lack of empirical marketing-focused studies. Intelligent devices, interacting machines and real time data transfer to the manufacturer may impact on trust, commitment and technology acceptance even in mature and IT-enhanced trustful buyer-seller relationships. A number of intelligent devices are able to share information and make collaborative decisions (Atzori, Iera, & Morabito, 2010). Cooperating with peers to achieve common goals, interacting with their objects and providing information in real time though standard communication protocols is a relevant contribution of the IoT to relationship building and maintenance (Zhang & Liu, 2014).

Manufacturers are focusing on IoT to improve machine efficiency and save maintenance costs. Clearly, buyers and manufacturers do not share the same vision of the IoT advantages. Even in long term relationships where trust in the manufacturer already exists, the data transfer to the manufacturer is an issue that causes serious concerns for buyers. Today, the buyer is more or less forced to exchange manufacturing process data with the seller. Therefore, the IoT affects product marketing and sales strategies and interferes in B-to-B buyer-manufacturer relationships.

Based on qualitative and quantitative research data, this article focuses on developing and presenting 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 research approach described in figure 1:



**Figure 1: Research approach**

Our paper is structured as follows: In the following chapter we explore the exchange interactions of relationships and networks by integrating the new challenges of the IoT. We also highlight the underlying mechanism between Western relationship marketing and Chinese *guanxi* by distinguishing *guanxi* from relationship marketing in terms of the personal and specific nature of the connection. We then discuss our qualitative research approach on exchange interactions integrating the IoT. In chapter four, based on the results of our qualitative research, we propose our conceptual model of the antecedents and consequences of trust in buyer-manufacturer relationships. Chapter five presents our quantitative research study on exchange interactions integrating the IoT, its hypotheses and 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 business market and the importance of adapting Western relationship marketing principles to *guanxi* marketing.

### **Relationships, networks and interactions**

Interaction is the essential analytical concept, the core of the relationship and network perspective of business markets as developed by the industrial marketing and purchasing (IMP) group (Huang &

Wilkinson, 2013; Håkansson & Snehota, 2006; Naude & Turnbull, 1998). Managing business relationships to create perceived value for both parties and at the same time enhancing trust is a challenge, given the natural variations in perspective resulting from network approaches (Medlin, 2004; Håkansson & Waluszewski, 2013). For companies, it is a challenge to control or direct relationships and networks or predict the outcomes of these interactions (Wilkinson & Young, 2002). Interactions are key to the relationship framework in business markets (Medlin, 2004). This is also true for relationships in the Information Age, where manufacturers have to convince their customers of the advantages the IoT has to offer: Today, goods, services and data are exchanged for economic and relationship value propositions. At first glance, the benefits of IoT-driven projects are mostly related to the manufacturers increase in machine-related manufacturing data. Today, it is still unclear who owns the big data produced by the IoT. Thus, the advantages, as well as possible disadvantages for the buyers need to be addressed separately, before IoT projects start.

As far as the development of business relationships are concerned, social bonds are generated within the norms of the present business and cultural environment. Adaptive interactions are associated with and participate in the construction of future economic exchange. Medlin (2004) argues that adaptive action refers to individuals collectively making economic decisions about future exchange. Following the literature, individuals move from the exchange norms of the society to a set of relational norms specific to the business relationship (Achrol, 1997; Nevin, 1995). Friedman (1960) had already concluded that this change not only depends on the relationship members' ability to rely on norms, but also be willing to change norms as time passes—which is closely related to the changes caused by the IoT. Accordingly, we consider interactions integrating the IoT as important relationship incidents able to change human perspectives of the future.

Enhancing the findings of Medlin (2004), and separating economic, social exchange interactions, we propose the following exchange actions by integrating the new challenges of the IoT:

**Table 1. Separating economic, social, technological and relational exchange by interaction type, extending the works of Medlin (2004)**

	Social Interaction without IoT integration	Adaptive Action	Social Interactions integrating the IoT
Purpose/Intention	Goods/services exchanged for economical gain	Adaption of exchange structure (i.e. buyer-manufacturer relationship)	Goods/services/data exchanged for economic and relationship value propositions
Interaction object, time location	past	present and future	future
Bonds between individuals	Economic bonds	Actor bonds	Economical, technical, relational bonds
Basis of bonds	Economic exchange	Economic and social exchange	Economic, social, and technological exchange
Behavior pattern	Norms governed by work situation, culture, society, formed by structuration processes	Trust, commitment, intentions, norms used, openness for changes according to partners, regions or the course of time	<u>Western Regions:</u> Relationship bonds are driven by trust, commitment, technology acceptance, intentions, norms used, open to change  <u>Asia:</u> <i>guanxi</i> (relationships or connections) is the drivers and the basis of norms and social or business behavior

In Western cultures, social bonds generated during economic interaction are understood as a result from individuals working closely together for years or decades. A fair and efficient legal system reduces buyer-manufacturer uncertainty and distrust (Bushman, Poitroski, & Smith, 2004). Based on this assumptions, Medlin (2004) argues the traceability of the quality of business relationships depends on the nature of intentions, their relative importance to the parties, the probability of events unfolding and the quality of past interaction.

In Western societies, relationship bonds are driven by trust, commitment, technology acceptance, intentions, and norms used (Medlin, 2004). Buyers and manufacturers in Western societies have economic and impersonal involvement in networking, whereas relational networking is mainly associated with commercial goals (Wang, Siu, & Barnes, 2008; Wang, 2007). In Asia, connections and relationships are drivers based on norms of social and business behavior. As far as the development of social bonds in Asia are concerned, relationship formation comes first, business interactions come second. The affective value of relationships is more important than the monetary value in social interactions. Thus, because integrating a company in a network of trusted relationships and connections (*guanxi*), there necessarily has to be a reliable buyer-manufacturer relationship first, before Western manufacturers may expect the Asian buyers' willingness to cooperate in IoT projects. In relational exchange, the choice behavior is constrained through the trust and commitment that develop between the two parties (Morgan & Hunt, 1994). Western relationship marketing and *guanxi* both share some basic characteristics such as mutual understanding, cooperative behavior and long-term orientation (Wang, 2007).

#### **A qualitative study on exchange interactions integrating the IoT**

A buyer's trust in the IoT credibility of the manufacturer is a prerequisite to building trust and confidence in these new technologies rather than increasing fears of total surveillance scenarios (Santucci & Lange, 2008). In line with the results incorporating the findings of Ventekatesh, Thong and Xu (2012), we assume that trust in buyer-manufacturer relationships is the basic requirement for relationship commitment. As already discussed, in Asia relationship formation comes first, business interactions come second (Berger, Herstein, Silbiger, & Barnes, 2015; Wang, 2007). Therefore, a trustful and reliable buyer-manufacturer relationship forms the basis of Western European and Asian buyers' willingness to cooperate with IoT projects. We argue that in addition to a trustful buyer-seller relationship, the trust in a manufacturer's credibility with regards to the IoT influences a buyers' relationship commitment as well as the technology acceptance of the IoT. Therefore, we propose:

P1a: Trust in a manufacturer's credibility with regards to the IoT influences the buyer's relationship commitment positively.

P1b: Trust in a manufacturer's credibility with regards to the IoT influences the buyer's technology acceptance positively.

The perceived usefulness and voluntariness of use, as well as trust in the credibility of the manufacturer's IoT procedures are key drivers of IoT technology acceptance (Ventekatesh, Thong, & Xu, 2012). According to the findings of Cho (2006), distrust is not only the absence of trust, but the active expectation that the other party will behave in a way that violates one's welfare and security. As a result, we composed our questionnaire explaining "Trust in seller's credibility with regards to IoT safety" based on his research study. Santucci and Lange (2008) argue that the credibility of the manufacturer's use of data obtained by IoT-related technologies is an antecedent of confidence in the use of these new technologies. Considering the commitment to be driven by the general trust in buyer-seller relationships as well as by the trust in manufacturer's credibility with regards to the IoT we expect:

P2 Relationship commitment has a positive impact on the willingness to cooperate with IoT projects.

P3a: The perceived usefulness of the IoT has a positive impact on the willingness to cooperation with IoT projects.

Considering relationship formation comes first, Western manufacturers entering the Asian market need to take an empathetic perspective without expecting immediate payback (Wang, 2007). Buyer-manufacturer relations involve benefits, costs – as well as relationship power, conflicts and dependence (Johnsen & Lacoste, 2016). Arguing that the buyer's anticipation of high switching costs gives rise to the buyer's interest in maintaining a quality relationship (Dwyer, Schurr, & Oh, 1987), the basis for future collaboration may be supported by implicit and explicit assumptions, trust, and planning. Therefore, we claim that a detailed knowledge of the challenges and benefits of the IoT, as well as the voluntariness of project cooperation are important relationship drivers influencing a buyer's willingness to cooperate with IoT-related projects and propose:

P3b: The voluntariness of project acceptance has a positive impact on the willingness to cooperation with IoT projects.

P3c: Buyer's familiarity with IoT technology has a positive impact on the willingness to cooperation with IoT projects.

Avoiding the common method bias in qualitative research (MacKenzie & Podsakoff, 2012) and in accordance with the exploratory nature of this research, we conducted both one-to-one and focus group interviews to evaluate our above propositions. We obtained qualitative data in 2015 from purchasing and production managers in customer firms in Austria and Germany.

The authors conducted the interviews and focus groups during Summer and Autumn 2015. We used a qualitative sample of 10 one-to-one interview partners and 30 participants in three focus groups, following a standardized open-ended format. The one-to-one interviews lasted between 45 minutes to 1 hour, whereas the focus group discussions took about 1.5 hours each. The one-to-one interviews were conducted at the customer's companies. The focus group interviews were carried out during the manufacturer's annual customer days at the manufacturer's company. For purposes of analysis, we recorded the interviews on a portable audio device with the respondents' consent. The authors briefed all interviewees on the nature of the study and objectives of the research prior to the interview. We then encouraged the interviewees to describe their perceptions and experiences as customers of this international manufacturing company (Churchill & Iacobucci, 2010). The questions we asked referred to the buyer's or production manager's trustful relationship towards the manufacturer, the duration of their buyer-manufacturer relationship, their expectations in new products and their satisfaction with existing ones. We also asked questions referring to the buyer's and production manager's attitudes towards the IoT: Former experiences, and their attitude with regards to possible data transfer between buyers and manufacturers.

In our study, the general attitude of the customers towards their supplier is positive. It turned out that to the customers, the features "quality of the manufacturer's machines" as well as "responding to customer requirements" are more important than "M2M connectedness" and "innovativeness of the M2M Interface". This leads to the conclusion that among the customers, the perceived usefulness of the IoT still is unclear. This may impact negatively on IoT acceptance. With regards to P1a and P1b, we find that trust in the manufacturer's credibility when using the IoT is a necessary prerequisite to relationship commitment and technology acceptance in the context of the IoT. Our qualitative data indicated that, although most buyer-seller relationships were long lasting and overall positively described, far fewer customers confirm their trust in the manufacturer's credibility with regards to IoT requirements.

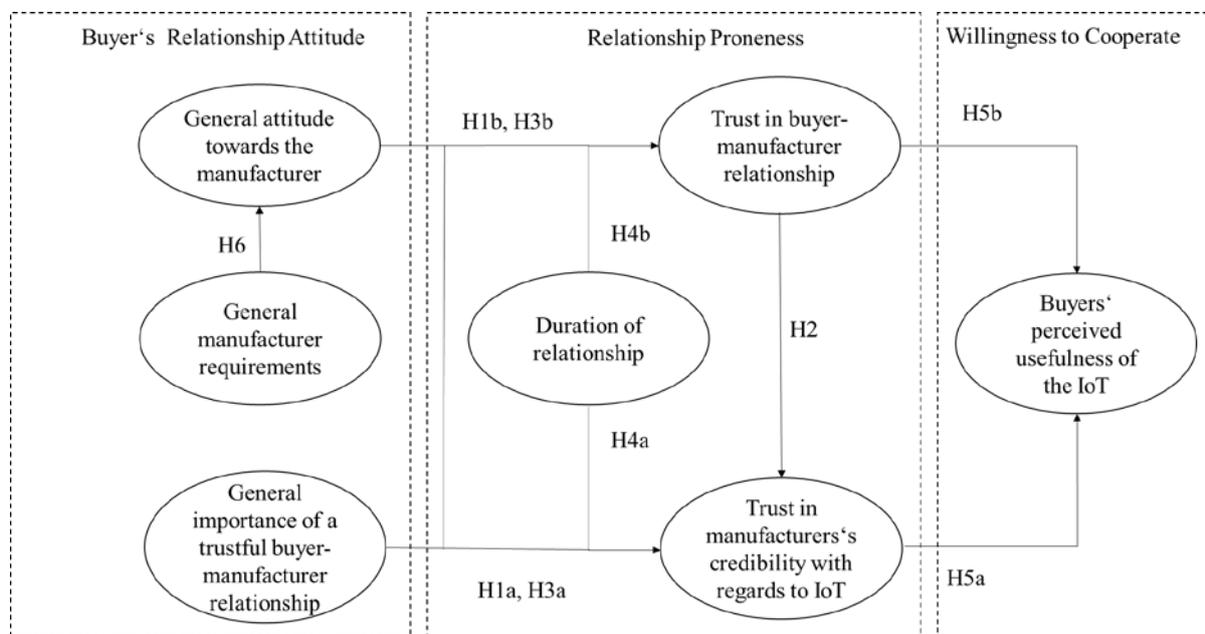
Our qualitative research supported P2 and P3a/b/c, we find that relationship commitment, the perceived usefulness of the new technology as well as the voluntariness of use impact on the willingness to cooperate with the manufacturer in IoT projects, and finally to agree to the exchange of machine, service and production-related data.

In line with the relationship drivers of Morgan and Hunt (1994), we enhance this list of factors that have an impact on the quality of business relationships by commitment and trust in future buyer-manufacturer interactions add an additional relationship network driver: A manufacturer’s credibility with regards to the IoT as well as a general positive attitude towards this technology. These findings form the basis of the following conceptual model.

**Conceptual model: antecedents and consequences of trust in buyer-manufacturer relationships**

Trust is considered a key dimension in international business relationships. Various sources as well as types of trust-have been identified in the Western and Asian literature (Seppanen, Blomqvist, & Sundkvist, 2007; Young, 2006; Styles & Ambler, 2003). Trust may change depending on the experience and outcomes of the actions and interactions and other incidents happening over time. (Wang, Siu, & Barnes, 2008). Perceptions and beliefs between buyers and manufacturers, as well as relational goals may vary as a result of the ongoing experience and the outcomes of those interactions (Huang & Wilkinson, 2013) and thus affect the nature and degree of trust.

Following the findings in the abovementioned literature, we propose a conceptual model of the antecedents of trust in international buyer-seller relationships, as well as trust in a manufacturer’s credibility for the IoT in business-to-business relationships. The antecedents relate to a buyer’s relationship attitude, while the consequences of both trust-related constructs is a buyer’s perceived usefulness of the IoT, e.g., the willingness to cooperate with IoT projects. Figure 2 depicts the latent variables integrated in our structural model as well as the propositions discussed in this chapter, for the formation of constructs, please refer to Table 3 in the annex. Certain events change the nature of present and possible future relationship interactions, these incidents may arise from either inside or outside the interaction context. We argue that the technological evolution associated with the IoT can be considered an event capable of changing the human perspective of the present and future buyer-manufacturer relationship.



**Figure 2: Conceptual model of the antecedents and consequences of trust in buyer-manufacturer relationships**

## **Quantitative research study on exchange interactions integrating the IoT**

Trust is a critical factor in the relationship building process and is recognized as a precursor of commitment toward a firm (Morgan & Hunt, 1994; Falkenreck & Wagner, 2014). Credibility, a customer's belief that the manufacturer has sufficient expertise to act reliably (Doney & Cannon, 1997), and benevolence (i.e. the manufacturer will not take advantage of the consumer's vulnerability) are two dimensions of trust (Geyskens, Steenkamp, Scheer, & Kumar, 1996). Credibility of the manufacturer's use of data obtained by IoT-related technologies is an antecedent that builds trust and confidence in the use of these new technologies rather than increasing fears of total surveillance scenarios (Santucci & Lange, 2008). When trust increases, Western buyers also feel a sense of moral obligation to the company they trust (Čater & Čater, 2010). Internet transactions are said to be riskier than other forms of consumer exchange due to a lack of opportunity for physical inspection and human interaction as well as privacy/security issues (Cho, 2006; Santucci & Lange, 2008).

The willingness of individuals in a social unit to trust others, as well as to be a trusted cooperator in networks are drivers of successful business relationships (Morgan & Hunt, 1994). General attitude towards the manufacturer refers to a partner's capability, reliability, or confidence in performing tasks according to expectation and obligation (Morgan & Hunt, 1994). Like trust-building, distrust is based on judgments of the other's ability and motives (McKnight & Chervany, 2001). Cho (2006) and Olivero and Lunt (2004), find that trust is important when managing customers' concerns about revealing personal or business information over the Internet. Technology acceptance models (e.g., TAM, UTAUT2) explain perceived usefulness and usage intentions in terms of social influence and instrumental cognitive processes.

The growing demand for data requires more than stronger security models that employ context related security. A buyer's trust in the credibility of the manufacturer's use of the IoT is a prerequisite to building trust and confidence in these new technologies rather than increasing fears of total surveillance scenarios (Santucci & Lange, 2008). We posit that trust in the buyer-manufacturer relationship, together with trust in a manufacturer's credibility for IoT safety impacts positively on the buyer's perceived usefulness of what the IoT can offer. Building upon the seminal conclusions of Morgan and Hunt (1994) and incorporating the findings of technology acceptance research (Ventekatesh, Thong, & Xu, 2012), we propose the following:

H1a. The perceived importance of a trustful buyer-manufacturer relationship has a positive impact on trust in manufacturer's credibility with regards to IoT.

H1b. The perceived importance of a trustful buyer-manufacturer relationship impacts positively on trust in buyer-seller relationship.

H2 Trust in buyer-seller relationships positively influences trust in a manufacturer's credibility with regards to IoT.

Western European companies often judge business relationships based on reputation and brand image, whereas an Asian business-to-business relation is mainly based on contacts or bonds with specific contact persons, not among organizations (Davies, 1995). In other words, the social relationship is a prerequisite for the business relationship. Developing interpersonal relationships, and trust at the personal level enhances the positive attitude towards the manufacturer and is a prerequisite for business success in Asia. Therefore, we hypothesize:

H3a. A positive attitude towards the manufacturer positively influences trust in manufacturer's credibility with regards to IoT.

H3b. A positive attitude towards the manufacturer positively influences trust in buyer-seller relationship.

H4a. The duration of the buyer-manufacturer relationship has a positive impact on the trust in manufacturer's credibility with regards to IoT. This effect is stronger in the Asian culture.

H4b. There is a strong positive relationship between the duration of the buyer-manufacturer relationship and trust in buyer-seller relationships. This effect is stronger in the Asian culture

The atmosphere in buyer-manufacturer relationships can be described by its power-dependence between the parties, the level of conflict and/or co-operation, overall closeness or distance and mutual expectations (IMP Group, 1982). Dependence can be regarded as positive as long as it is combined with a high level of trust and brings relational benefits to the other party (Johnsen & Lacoste, 2016). We argue that trust, benefits and dependence also refers to the perceived usefulness of the IoT as well as to the supplier requirements and posit:

H5a. Trust in manufacturer's credibility with regards to IoT positively influences the perceived usefulness of the IoT.

H5b. Trust in buyer-manufacturer relationship positively influences the perceived usefulness of the IoT.

H6. The general supplier requirements positively influence buying center member's general attitude towards the manufacturer.

Given that diverse relationship mechanisms exist, differences in business cultures are considered to be one of the major impediments to global business (Wang, 2007). Therefore, following the findings of Berger et al. (2015) and Wang, Siu and Barnes (2008), we expect a significant difference between Western and Asian regions.

### **Outline and results of our quantitative research study**

In 2015, we sent an international online survey to customers and future customers of a German machine manufacturer. Data were gathered from CEOs, purchasers and heads of production. Participants in our online research came from Western Europe (N= 497) and Asia (N=48), among other regions. With regards to the Western European dataset, we were able to confirm all propositions, in the Asian dataset, we were only able to confirm four out of 10 propositions (table 2).

**Table 2: Overview of results**

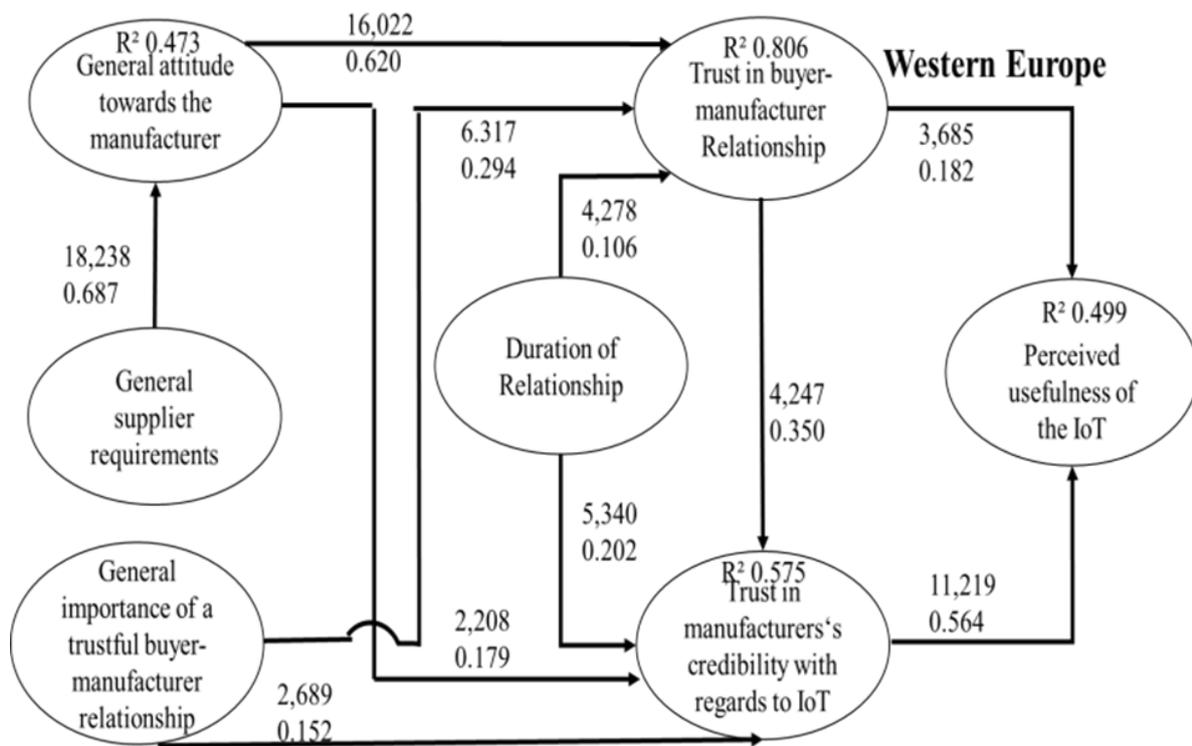
Proposition	Western European Data	Asian Data
H1a	supported	not supported
H1b	supported	supported
H2	supported	not supported
H3a	supported	not supported
H3b	supported	supported
H4a	supported	not supported
H4b	supported	not supported
H5a	supported	supported
H5b	supported	not supported
H6	supported	supported

Model fitting and all the calculations presented here are done by using Smart-PLS software (Ringle, Wende, & Will, 2005). We tested the reliability of both datasets, including Cronbach's Alpha, AVE and SRMR factors (see table 3 in the annex).

Comparing the results of both regions, we like to highlight the similarities first. There is a strong positive relationship between the general supplier requirements and the general attitude towards the manufacturer. In both regions, this construct positively impacts on the development of trust in buyer-manufacturer relationships. This may lead to the conclusion that in Western Europe as well as in Asia, the increase of trust in buyer-manufacturer relationships is mainly driven by attitudinal relationship constructs and confirms the findings of Davies (1995), claiming that in Asia interpersonal relationships, and trust at the personal level enhances is a prerequisite for business success in Asia. We were able to explain about 80% (Western Europe) and 90% of the impact factors driving the development of trust in buyer-manufacturer relationships.

As indicated in Table 2, with regards to the Western European dataset, we were able to confirm all our hypotheses. Nevertheless, we were only able to explain about 50% of the impact factors on trust in manufacturers' credibility with regards to IoT – this leads us to the conclusion that a buyer's perceived usefulness of IoT projects is driven by additional measures, too. In Western Europe, buyer's perceived usefulness of IoT projects is positively correlated to both trust-related constructs. The West European data also indicates a positive relationship between the construct duration of the relationship and both trust-related constructs. Also, we find a strong positive relationship directly between both trust-related constructs. Trust in buyer-manufacturer relationship positively influences the development of trust in a manufacturer's credibility with regards to the IoT.

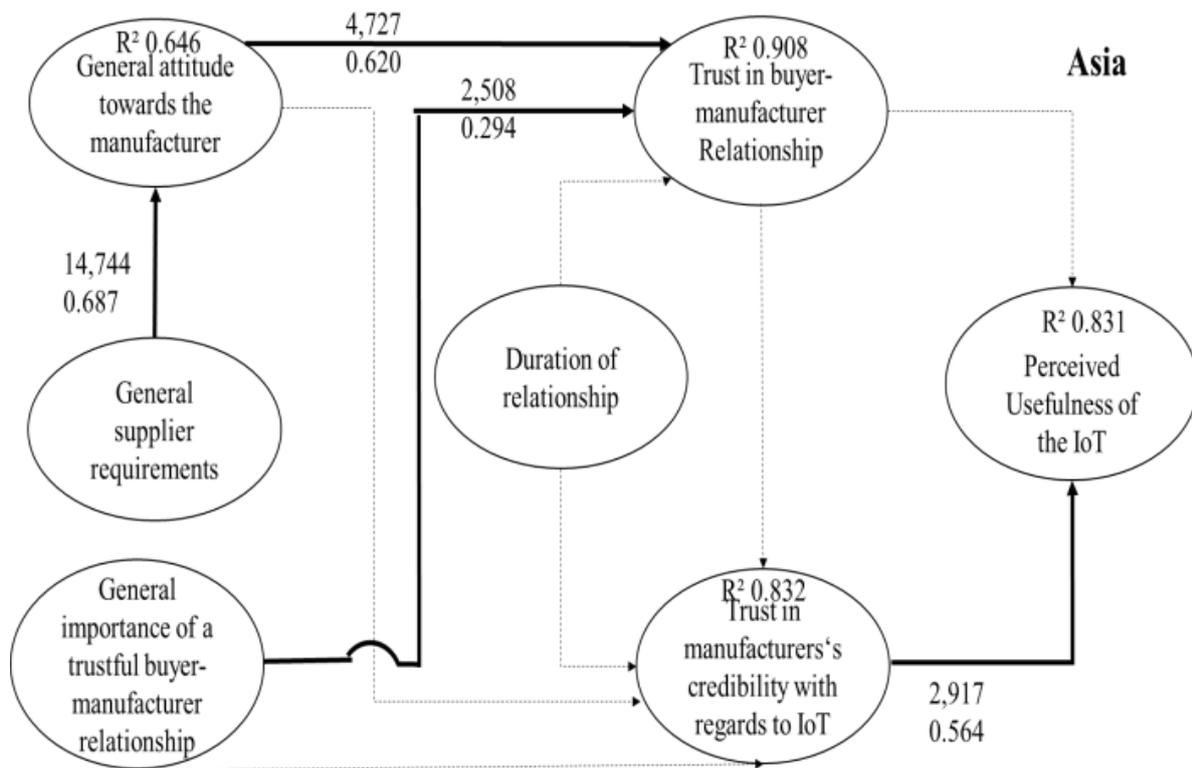
For members of buying centers in both Asia and Europe, trust in buyer-manufacturer relationships is strongly driven by the general attitude towards the manufacturer as well as the general importance of a trustful buyer-manufacturer relationship.



**Figure 3: Results of Western European dataset**

With reference to the Asian dataset, we were only able to confirm 4 out of 10 hypotheses. The perceived usefulness of the IoT is very strongly driven by the construct trust in a manufacturer's credibility with regards to the IoT. Our data analysis explains 83% percent of all impact factors from a

buyer's perceived usefulness of IoT projects, although there exists only one significant positive relationship between the constructs trust in manufacturers' credibility in IoT and perceived usefulness. Interestingly, with reference to above hypotheses 4a and 4b, the Asian data does not indicate any relationship between both trust-related constructs and the duration of the buyer-manufacturer relationship. Trust in the buyer-manufacturer relationship does not impact on the development of trust in a manufacturer's credibility with regards to the IoT.



**Figure 4: Results of Asian dataset**

The literature discusses whether in cross-cultural research it is appropriate to employ Western models to measure Asian relationship mechanisms, as such an approach fails to tap cross-cultural differences accurately (Berger, Herstein, Silbiger, & Barnes, 2015; Wang, Siu, & Barnes, 2008; Wang, 2007). Our findings confirm this issue. Obviously, it is difficult for researchers to cover *guanxi*, this special type of Asian relationship that bonds the exchange partners through reciprocal obligations if Western-based marketing constructs and frameworks are used. Following the findings of the aforementioned researchers, arguing that in Asia trust in certain contact persons is developed first and impacts on the general attitude towards the manufacturing company, we even have to think about turning around the structural path relationships between the constructs of trust and the general attitude towards the manufacturer. Nevertheless, we were able to confirm H5a in both regions and argue that trust, benefits and dependence also refers to the perceived usefulness of the IoT. Trust in manufacturer's credibility with regards to IoT positively influences the perceived usefulness of the IoT.

**The Internet of Things: chance or challenge in international business networks?**

Relationship marketing recognizes “the importance of managing . . . buyer–seller relationships as strategic assets” (Webster Jr., 1992, p. 7), all marketing activities are “directed towards establishing, developing, and maintaining successful relational exchanges” (Morgan & Hunt, 1994, p. 22). Our study enhances the findings of Medlin (2004), claiming that relationship bonds are open to change

due to economic, social, and relational impact factors by additionally integrating technical impact factors as drivers of relationship bonds.

Based on our qualitative research results and considering the findings of Johnsen and Lacoste (2016) regarding unbalanced and asymmetric relationships and dependence, we argue that the voluntariness of cooperating with IoT project is an important issue for project success.

Comparable to Western European markets, the Asian markets provide both opportunities and challenges for manufacturers launching IoT technologies in B-2-B projects. IoT provides manufacturers with an opportunity for a new quality of production and service data, a possible improvement of machine efficiency and reduction of maintenance costs. Nevertheless, as far as Western Europe is concerned, new IoT policy challenges in B-to-B relationships increased fears of total surveillance scenarios and raised concerns that impact on a buyer's willingness to cooperate with the manufacturer. This is in line with the results of Santucci and Lange (2008) claiming that the credibility of the manufacturer's use of data obtained by IoT-related technologies is an antecedent of confidence in the use of these new technologies. As discussed in chapter 2 of our study, relationship bonds between buyers and manufacturers in Western regions are driven by trust, commitment, technology acceptance, intentions, and norms used. Research results indicate that in Western Europe as well as in Asia, the willingness to cooperate with IoT projects is driven by a buyer's attitude towards the manufacturer and also by the general importance of a trustful buyer-manufacturer relationship. Factors influencing buyer-manufacturer relationship proneness differ between both regions and should therefore be monitored separately.

Our study empirically confirms the importance of trust in a manufacturer's IoT credibility and benevolence to achieve the buyer's willingness to co-operate with IoT projects. With reference to our first research question, how do IoT challenges impact international buyer perceptions of IoT usefulness, we were able to show that in Western European buyer-manufacturer relationships, trust in the manufacturer as well as the duration of the relationship positively impacts on trust in a manufacturer's IoT credibility and benevolence. There is a strong positive relationship between both trust-related constructs and a buyer's willingness to co-operate with IoT projects. If a trustful relationship exists, a Western European buyer's willingness to co-operate with IoT projects can be expected. This does not hold for Asian buyers. Here, a manufacturer's IoT credibility is not influenced by an existing trustful relationship and its duration. The value exchanged in an Asian relationship is, among others, related to knowledge, obligations that possibly are to be repaid in the future, loyalty, commitment, and trust (Styles & Ambler, 2003). In addition, these transactions may relate to both, the company and the individual manager e.g., buyer.

Our second research question relates to the theoretical background of our study and leads us to the scientific implication of this study: Can the perceived usefulness of IoT projects be improved by Commitment-Trust Theory and technology acceptance model impact factors? We developed and tested a conceptual model of the antecedents and consequences of trust in buyer-manufacturer relationships that leads to an increase in technology acceptance of IoT projects.

The difference between short-term Western views and the long term Asian perspective of business are frequently discussed in the cross-cultural literature (Berger, Herstein, Silbiger, & Barnes, 2015; Wang, Siu, & Barnes, 2008). Thus, our research was also focused on possible regional attitudinal differences towards the IoT's perceived usefulness. Our findings show that if a manufacturer is perceived as being trustful with regards to IoT data transfer, storage and IT safety, an Asian as well as a Western European buyer's willingness to cooperate in IoT projects increases. In Western Europe, the general importance of a trustful buyer-seller relationship positively impacts on trust in the buyer-manufacturer relationship, but in Asia, this construct does not influence a buyer's trust in a manufacturer's credibility with regards to the IoT. With regards to Western-Asian relationships, manufacturers who aim at establishing international IoT projects have to consider that the particular IoT project has a role beyond the immediate benefits it brings, such as the delayed benefits ("obligations") created (Styles & Ambler, 2003). In the communication and negotiation phase,

neither the transaction nor the relationship should be prioritized above the other, but rather be thought of as mutually reinforcing and achieving the same goal.

Asian buyers are embedded in various national markets that cannot be treated as a homogeneous target group. Nevertheless, with reference to exchange interactions on most of the Asian markets, *guanxi* is the driver and the basis of norms and social or business behavior. Interpersonal relationships and networks are a key part of business in Asia, too, and thus are very important for both Western and Asian business partners (Styles & Ambler, 2003; Berger, Herstein, Silbiger, & Barnes, 2015; Morgan & Hunt, 1994; Wang, Siu, & Barnes, 2008). Therefore, the first managerial implication of our study refers to both regions: a positive attitude of the buyers towards the manufacturer is key to developing a trustful buyer-seller relationship as well as trust in manufacturer's credibility with regards to the IoT.

A second managerial implication is related to the fact that the linkage between trust in buyer-manufacturer relationship and a buyer's perceived usefulness of IoT projects is non-existent in the Asian dataset. In contrast to Western Europe, trust in buyer-manufacturer relationships does not drive trust in the manufacturer's credibility with regards to the IoT. In this region, it is not sufficient to rely on the general trustful relationship to increase a buyer's willingness to cooperate with IoT projects. Also, the duration of the buyer-seller relationship plays a less important role with reference to the development of trust.

As already discussed, our data indicate that in Western Europe, a buyer's willingness to cooperate in IoT projects is influenced by various drivers. Among others, the duration of the relationship is an important factor. This is a challenge for newly developed business relationships. It can be expected that the willingness of new customers to cooperate with IoT projects is limited. Trust in the manufacturer clearly drives trust in the manufacturer's credibility with regards to the IoT as well as the perceived usefulness of IoT projects. In Western Europe, both trust-related constructs are interacting.

This leads us to our third managerial implication. Our results show that trust in a manufacturer's credibility with regards to data safety and data transfer for buyers is a key motivation to engage in IoT projects.

This paper is the first to empirically show that even in the context of new technology acceptance (IoT projects), the Asian concept of *guanxi* is the driver and the basis of business behavior. To achieve IoT project success, enhancing the manufacturers IoT credibility has to be the essential part of an honest and open communication strategy. If new IoT-enhanced projects are proposed to Asian buyers, not only the buying company as a whole should be addressed, possible obligations related to these projects (e.g. a leap of faith of Asian buyers in the new IoT technology) need to be considered, addressed, explained and agreed upon personally and jointly with the Asian buyers involved. Both parts of *guanxi*, relationships and connections, need to be addressed. Marketing communication should therefore involve and address both the company as a whole and the Asian buyer as the contact person. Campaigns must – as an important driver of the perceived usefulness of IoT projects - focus on the enhancement of trust in the manufacturer's credibility with regards to the IoT.

No trust in a manufacturer's credibility with regards to the IoT – no data transfer between buyers and manufacturers. This is true for both regions, Western Europe and Asia. International manufacturers should carefully consider these findings when thinking about establishing international IoT projects.

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## APPENDIX

**Table 3: Formation of constructs**

Construct	Items defining the construct
General supplier requirements (competence)	With regards to your buying decision, please rate the importance of the following features: (7 point Likert-type, of utmost importance – very unimportant) Quality of machines, technical support, service support
General attitude towards the manufacturer	With regards to your experience with company X, please rate the quality of the following features: (7 point Likert-type, much better – much worse) Quality of machines, technical support, service support, fulfillment of customer wishes
Trust in manufacturers credibility with regards to the IoT, items and scales based on Cho (2006)	Company X will be responsible and reliable in working with customer data. With regards to data selection and data use, company X will promote customers' benefits as well as its own. Company X will not engage in any kinds of exploitive and damaging behavior that impacts negatively on its customer's data safety. 7 point Likert scale from "I am convinced that this is the case" to "I don't believe that this is the case at all"
Trust in Buyer-Seller relationship	Please let us have your opinion on the following statements: (7 point Likert-type, I completely agree - I completely disagree) Our company maintains a trustful business relationship to company X. In general, our company is very much satisfied with the business relationship to company X. If I compare the performance of company X to the performance of my other suppliers, the performance of company X is much better.
Duration of relationship	How many years have you worked with company X? (scale: <5 years, between 5-10 years, between 10-20 years, > 20 years.)
General importance of a trustful relationship	Please let us have your opinion on the following statements (7 point Likert, I completely agree - I completely disagree)" A trustful buyer-seller relationship is the basis of a successful business co-operation. Listening and responding to our needs is very important to our company.
Perceived usefulness of IoT product innovation	The Internet of Things technology implies, among other things, that data exchange between buyers and sellers is made possible in a fast and easy way. Companies in an integrated supply-chain network collaborate with their suppliers and buyers and share information, service data and knowledge. Please let us have your opinion on the following statements (7-point Likert scale, ranging from 1 (strongly agree) to 7 (strongly disagree). In general, the data-exchange option of the Internet of Things is a very helpful support for buyers and sellers. Connecting machines to the supplier via the Internet is a helpful service offering with regards to maintenance.

**Table 4: Reliability assessment**

	Cronbachs Alpha Asia	Cronbachs Alpha Western Europe	Composite Reliability Asia	Composite Reliability Western Europe	AVE Asia	AVE Western Europe
<b>Attitude Company</b>	0.883	0.918	0.923	0.942	0.751	0.803
<b>Duration of relationship</b>	1.000	1.000	1.000	1.000	1.000	1.000
<b>General supplier requirements</b>	0.948	0.894	0.966	0.934	0.905	0.826
<b>Importance of Trust</b>	0.884	0.688	0.945	0.864	0.896	0.761
<b>Trust in Buyer-Seller</b>	0.956	0.910	0.972	0.943	0.920	0.848
<b>Trust manufacturers 4.0 Cred</b>	0.913	0.951	0.946	0.968	0.853	0.910
<b>perceived usefulness</b>	0.817	0.803	0.916	0.910	0.844	0.835

**Table 5: SMRM criteria**

	Asia	Western Europe
SMRM Composite Factor	0.074	0.04
SMRM Common Factor	0.085	0.063