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MUTUAL TRUSTWORTHINESS AS A GOVERNANCE MECHANISM IN BUSINESS RELATIONSHIPS – A DYADIC DATA ANALYSIS*

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Based on a literature review, we develop a research profile that illustrates that survey-based, trust-related empirical research has severe limitations. It usually carries out general relationship analysis using single end or quasi two-sided sampling and classic statistical constructs. We designed and carried out an empirical research that was highly situational, applied dyadic operationalisation, pairwise sampling, and dyadic data analysis – a special statistical approach and toolset developed by psychologists and used to analyse interdependencies in relationships. Our main contribution is methodological and theoretical since the paper gives a structured overview on the methodological challenges in analysing mutuality in trust, but also in other relational attributes. The paper not only makes these methodological problems explicit, but also offers a potential solution to overcome some of their limitations.

Keywords: business relationship, trust, trustworthiness, governance, mutuality, pairwise sampling, dyadic data analysis

JEL classification indices: C49, D22, L20, M20

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1. INTRODUCTION

This paper introduces a business application for a relatively new statistical technique called dyadic data analysis that has been developed in social psychology; it is also called the statistics of interdependence (Gonzalez – Griffin 2000). The importance of adaptation and, consequently, interdependence between cooperating partners is widely accepted in business research. Today, it may sound stereotyped to say that interactions lead to adaptation on both sides of a business relationship, creating interdependence between partners. It is also widely accepted that this interdependence can increase the competitiveness of business relationships and firms cooperating in them (Noordewier et al. 1990; Dyer – Singh 1998; Fawcett et al. 2012). Successful partnerships necessitate a long-term orientation for both actors, adaptation and mutuality in several crucial relational characteristics such as trust, satisfaction (Ivens 2004), commitment (Holm et al. 1999), and power (Cox 2004). Researches still lack both conceptual clarity and analytical constructs that are capable of measuring and analysing interdependence in general, and mutuality in particular. Dyadic data analysis is an attempt to bridge this methodological gap (Gonzalez – Griffin 2000; Burk et al. 2007).

Our paper presents research using pairwise sampling and dyadic data analysis. The research hypothesis is as follows: in a business relationship characterised by mutually high levels of trustworthiness perceived by each counterpart, the willingness to be involved in risky situations is higher than in relationships in which actors do not mutually believe that their partners are highly trustworthy. Mutually high levels of trustworthiness can act as a governance mechanism and, in such cases, trust appears in the relationship. The above hypothesis is empirically analysed in situations in which sensitive information is to be shared between actors, creating risk and vulnerability in the relationship.

The interplay between trust and information sharing is not a new research area. Dyer et al. (1998) investigated supplier-buyer relationships, including such characteristics as information sharing and trust. They concluded that both of these characteristics were differentiating factors in a long-term strategic type of cooperation in the Japanese automotive industry. Dyer – Chu (2003) calculated the correlation between trust and information sharing in US, Japanese, and Korean automotive supply chain partnerships and established that there is a strong correlation between the supplier's trust in the buyer and its willingness to share confidential information with its partner. Kwon – Shuh (2004) interpreted information sharing as a prerequisite for the buyer's trust. Our hypothesis focuses on the turnaround effect; we analyse whether mutual trustworthiness can act as a governance mechanism in risky situations such as sharing sensitive information. These two approaches are not contradictory because a given level of trustworthi-

ness between partners in a relationship is the result of an ongoing investment process (Otto – Obermaier 2009). Due to this ongoing investment process, the accumulated level of trustworthiness is both a prerequisite, but also a consequence of other relational phenomena.

The most important limitation of the studies on trust is the way they measure and analyse relational characteristics, including trust. Although several researchers have already emphasised that research on any relational phenomena should be carried out in a dyadic way (Andreson et al. 1994), studies are still lacking this approach and are single-ended in nature (Brennan et al. 2003). As Henneberg et al. (2009) pointed out, researchers use five types of operationalisation when relational attributes are analysed, and only one of them is really a dyadic one. All the others capture only one side of the relationship, e.g. the customer or the supplier in supply chain type of relationships. But even if the way of measuring is dyadic, classic statistical tools are not capable of capturing important the effects of the specific context different business relations have. This inevitably means that analytical results systematically tend to generalise and fail. It is straightforward, for example, that satisfaction, commitment, or trust are all relation-specific and that their levels vary to a great extent in different relationships. Still, current research misses the opportunity to analyse the differences that stem from these relation-specific contexts; for example, the differences in perceptions that exist between partners in concrete relationships (the so-called individual effect) and the differences between relationships (the dyadic effect) (Gonzalez – Griffin 2000; Burk et al. 2007). This limitation can be overcome with real dyadic measurement and using constructs of dyadic data analysis (Ickes – Duck 2000). To the best of our knowledge, dyadic data analysis still lacks a business research application. Our survey-based empirical research aims at filling this research gap and applies a real dyadic operationalisation and dyadic data analysis for testing our hypothesis. Our objective is not to develop the methodology, but to show an application that leads to a deeper understanding of trust.

In the next section, systematic a literature review is presented. First, the theoretical background of our hypothesis is given, followed by a focused literature review on the state of the art survey-based empirical research methodology related to trust in business relationships. We point out that these widely used solutions have severe limitations and are not capable of testing our hypothesis. We suggest a research design and a methodology that guarantee real situational analysis and make dyadic measurement and analysis possible. We outline our research design and the applied methodology. Finally, results are presented and discussed in detail.

2. THEORETICAL FOUNDATION – DEVELOPING OUR HYPOTHESIS

Trust has an extremely rich literature that spreads over several areas even in the field of economics and management. We interpret trust as a governance mechanism in business relationships; consequently, our paper is closely linked to Transaction Cost Economics (TCE) (Coase 1937; Williamson 1975). Although TCE acknowledges that trust plays a key role in governing the course of events in any business relationships, it does not provide a clear definition of it. The business-to-business transactions (B2B) literature is robust in this respect, although several competing interpretations and definitions are still available. In our theoretical foundation, first we introduce the concept of governance in general, and relational governance in particular, where relational attributes – such as trust – play the crucial role. Then we interpret the term trust and a closely linked concept, trustworthiness.

2.1. Governing business relationships

The concept of governance in TCE is closely linked to coordination. Coordination mechanism is a broad term specifying the general rules of regulating and intermediating micro-level processes that takes place between cooperating partners in any relationships (Kornai 1984; Rosenbaum 2000). These rules include the mode of governance. Governance mechanisms are defined as safeguards against opportunism that firms employ in order to govern their relationships, when they face the possibility of opportunistic behaviour (Jap – Ganesan 2000; Olsen et al. 2005; Wang et al. 2008).

TCE focuses on the two classic coordination mechanisms, the market and the hierarchical (or bureaucratic) coordination, but their representatives acknowledge the existence of additional mechanisms too. Ouchi (1980), for example, introduced the term of clan coordination, where common values and beliefs (e.g. trust) play a crucial role in governing the relationship. Kornai (1984) introduced the ethical and the aggressive mechanism of coordination. In both cases, relational characteristics – altruism and power – are the instruments of governance. Medlin et al. (2005) called the type of coordination where relational attributes and norms are the ones that govern the relationship as relational coordination. On the whole, the theory distinguishes three basic types of coordination and their corresponding governance mechanisms as follows (Jap – Ganesan 2000; Olsen et al. 2005; Zaheer – Venkatraman 1995; Yu et al. 2006; Wang et al. 2008):

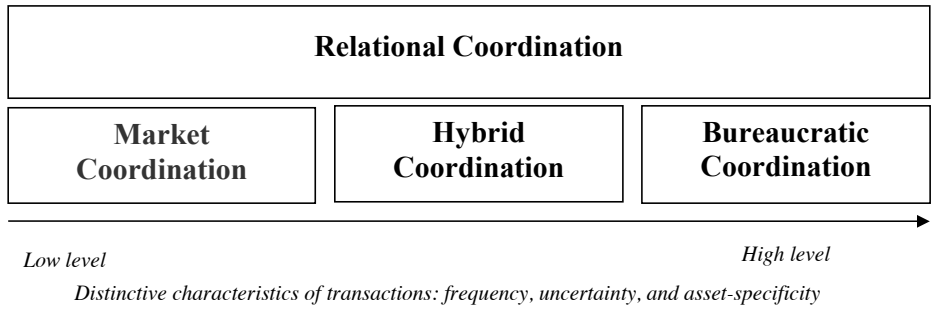

Figure1. Supplementary character of different coordination mechanisms

Source: Authors' presentation based on Simon (1945); Bradrach – Eccles (1989); Poppo – Zenger (2002); Olsen et al. (2005).

(1) market coordination and its governance mechanism: the contract,
(2) hierarchical (or bureaucratic) coordination and its governance mechanism: ownership, and property rights, and
(3) relational coordination: where relational characteristics (e.g. trust) play the role of governance.

According to TCE, three characteristics of the exchange influence the decision of which coordination and governance mechanism to apply (Williamson 1981, 1985). These characteristics are the frequency, the uncertainty, and the asset specificity of the exchange. Let us imagine a continuum on one end, with transactions characterised by a very low level of uncertainty, asset-specificity, and frequency. The other end of this continuum represents transactions with extremely high frequency, uncertainty, and asset specificity. In case transactions are uncertain, characterised by a high level of asset specificity, and/or are frequent, the ideal coordination mechanism is the hierarchical one, while around the other end of this continuum, market coordination is suggested to be applied (*Figure 1*). According to Ouchi (1980), clan coordination (as a specific representation of relational coordination) is suggested to be used in the middle of this continuum. This kind of interpretation supposes that different coordination mechanisms are exclusive to one another.

2.2. Relational governance and related key concepts: trust and trustworthiness

Other researchers (Bradrach – Eccles 1989; Olsen et al. 2005) suggested that in most real-life situations a mix of different coordination and governance mechanisms are applied, so coordination and their governance mechanisms are supple-

mentary in nature. When, for example, the above-mentioned distinctive features of the transaction tend to be moderately strong, hybrid coordination and governance is present, such as complex contracts with partial ownership agreements between partners (Dyer et al. 1998). These hybrid solutions combine the two classic formal coordination mechanisms, market with hierarchical coordination (Yu et al. 2006). But the supplementary character is true in the case of the relational coordination too (*Figure 1*). Neither a good contract nor full ownership can guarantee that all future, potentially risky transactions are governed. In these situations, relational norms play a decisive role. We accept the complementary nature of different coordination and governance mechanisms. Our hypothesis actually aims at testing the role of a special relational attribute in governing formally non-regulated, but risky situations.

Trust has always been an important feature and intensely researched aspect of behaviour between persons and organisations. Research on trust has a long-standing tradition in psychology (Deutsch 1958; Larzelere – Huston 1980). Based on their findings, several management areas have put effort into understanding trust between cooperating business organisations. It is clear that organisations do not behave the same way as persons do, and therefore conceptualising and measuring interorganisational trust is a real challenge (Anderson – Narus 1990; Zaheer et al. 1998). Despite the theoretical differences between personal and organisational trust, it is widely accepted that organisations can be interpreted as sets of actors. Organisational trust is also based on personal trust, consequently empirical analysis captures interorganisational trust along the perceived level of personal trust among professionals (Zucker 1986; Bachman 2001).

As pointed out earlier, while interpreting relational coordination and its governance mechanism, TCE uses the term trust. According to the traditional interpretation, trust is the credibility and benevolence of the trustee perceived by the trustor (Ganesan 1994). Kumar (1996) similarly defines trust as the confidence of the trustor that the counterpart in a business relationship will not exploit one's vulnerabilities even in situations where such opportunistic behaviour would be possible. This interpretation is the basis of a rich body of literature focusing on different types of trust, where typology is based on the source of this confidence (Korczynski 2000).

There is a different approach to trust in the literature as well. This draws a clear distinction between trust and trustworthiness (Mayer et al. 1995). It stresses that the above introduced concept is a characteristic of the trustee; thus, it is about the trustworthiness of the trustee and not trust itself. Trustworthiness is a perception; a perception of one actor, the trustor's, about a key feature of the trustee's. Trust itself is a closely related, but conceptually different term. It indicates the trustor's intentions in risky situations with the trustee. Trust in this case is interpreted as

the trustor's willingness to engage in risky behaviour with a counterpart in a specific relationship and a specific situation.

Risk plays a key role in both interpretations since trustworthiness as well as trust are important only in situations involving actions in which vulnerability and risk are present. It is an axiom in trust-related research that trust can empirically be investigated only in risky situations (Luhmann 1979). But the distinction between trust and trustworthiness outlined above is crucial. Based on this distinction, the terminology used by TCE has to be refined: Not trust, but trustworthiness is or can be the safeguard against potential opportunism and may play the role of governance, and influence the actual behaviour. According to our hypothesis, trust – interpreted as the willingness to act in risky situations – does depend on the accumulated levels of trustworthiness between partners in the relationship. It appears only when the levels of perceived trustworthiness are mutually high. In such cases, partners in the relationship will be willing to engage even in situations associated with a high level of risk that are not governed by formal governance mechanisms, either contract or ownership.

Whether perceived levels of trustworthiness are enough to facilitate the appearance of trust and help governing risky situations is an important theoretical question that also has practical relevance. The answer to this question directly depends on the level of risk associated with the analysed situation (Gefen et al. 2003). Therefore, trust-related research should be highly situational. Not only relational partners, but also analysed events should be very concrete. It is not by chance that qualitative case studies (Canning – Hanmer-Lloyd 2007) and experimental economics are the preferred research methodologies (Wang – Huff 2007) in trust-related research. But we argue that survey-based research can also meet the requirement of this situational character when real dyadic sampling and dyadic data analysis are applied.

In the following, we develop the state of the art methodological profile of current survey-based trust related research and highlight that this does not ensure the needed situational character of empirical research. Next, dyadic data analysis is shortly introduced, our own empirical research is presented, and the results are interpreted and discussed.

3. STATE OF THE ART METHODOLOGICAL PROFILE OF SURVEY-BASED TRUST LITERATURE

Analysing trust makes it necessary to be able to operationalise, measure, and analyse it in concrete situations. We have conducted a literature research review to map the state of the art research methodology and check to what extent it

meets the above-mentioned situational requirement. The majority of the papers on trust in business relationships have applied qualitative research (e.g. Friman et al. 2002; Lee – Trim 2012; Fawcett et al. 2012); we have omitted these from our review because we concentrated on papers applying quantitative analyses based on surveys. The same reasoning is behind omitting publications applying experimental economics and game theory as their analytical method (Rieskamp – Todd 2006; Pech – Swicegood 2013). We have processed 26 articles presenting survey-based quantitative research on trust in dyadic business setting. All these articles were published after the millennium, so they represent current methodological solutions. Therefore, we think they constitute a sound basis for developing the state of the art methodological profile.

Mutuality is a core concept in our hypothesis and a key issue in B2B research in general. Still, conceptualisation and measurement are underdeveloped in most of the papers. We accept the conceptualisation of Svensson (2006; based on Smith – Barclay 1997; Smith 1999). This points out that measuring mutuality necessitates the following two elements to be present:

(1) the levels of the relational characteristics in a given relationship perceived by the partners have to be measured in a dyadic way, because

(2) only in such cases can the balance between these perceptions be captured.

The conceptual separation, but also the analytical coupling of these two elements, makes it possible to measure mutuality in business relationships. This necessitates a clear dyadic approach in both measurement and analysis. We show that state of the art research methodology in trust-related literature is typically not capable of separating while simultaneously coupling the two above-mentioned elements of mutuality and capturing their systemic effects during analysis. This is because a real situational approach, dyadic measurement, and analysis are missing.

During our literature review, we identified four key characteristics of the applied quantitative, survey-based research methodology that are relevant for a situational and real dyadic research. These key characteristics are as follows:

(1) concreteness of the analysed business relationship,

(2) concreteness of the situations analysed,

(3) applied sampling technique, and

(4) applied statistics.

(1) The concreteness of the relationship analysed: several papers asked their respondents to evaluate trust/trustworthiness in relationships without specifying the concrete partner being analysed. These respondents were typically asked to evaluate trust in their customer or supplier relationships in general. In our methodological profile, these studies are called surveys applying general relational

analysis**.** In other studies, questions aimed at measuring trust in concrete relationships. In these cases, respondents were asked to evaluate a concrete relationship with one specific partner (e.g. the most important customer or supplier). We call this type of analysis concrete relationship analysis.

(2) Concreteness of the situation analysed: although risk belongs to the core aspect of all trust-related research, none of the articles have analysed concrete business situations, where the actual level of risk could have been measured.

(3) Applied sampling techniques: despite the theoretical differences between personal and organisational trust (Anderson – Narus 1990), it is widely accepted that organisational trust is basically a personal construct and it is measured using the perceptions of key informants (Håkansson – Snehota 1995). A specific problem is how to operationalise these perceptions. Henneberg et al. (2009) have identified five types of such operationalisation: pure monadic operationalisation, antagonistic perceived monad, internal dyad, perceived dyad, and dyad.

- Pure monadic operationalisation: only one partner's informant(s) of a business relationship participate(s) in the sampling process. The classic situation is when the representative of a customer or a supplier cooperating in a supply chain type of relationship is asked to evaluate the relational attribute under analysis. For example, a purchasing manager is asked to evaluate to what extent his/her company is committed to the relationship with a given supplier.
- Antagonistic perceived monad: as indicated by the name, here we also have a monadic type of operationalisation since only one side of the relationship takes part in measuring the relational attribute. Here we ask the representative of one party to indicate his/her perception related to the other party's perception. For example, we ask the customer firm's key informant: "Please indicate, to what extent do you think your supplier is committed to the relationship!"
- Internal dyad: this operationalisation aims at analysing the relationship between different relational attributes, for example commitment and trust. Measuring both attributes happens in a monadic (pure or antagonistic) way because only one side of the relationship participates in the survey. Let's say, the customer's informant is asked to indicate both the perceived level of trust and of commitment toward a supplier.
- Perceived dyad (quasi dyad operationalisation): in such a case, perceptions related to a specific relational attribute are asked to be evaluated from the perspective of both partners. But again, only one partner of the relationship actually participates in the sampling process. This operationalisation is nothing else than the parallel application of the pure and the perceived monadic operationalisation.

- Dyadic operationalisation: this is the single really dyadic operationalisation, where key informant(s) of both partners are actually asked to participate in the survey and indicate their perceptions.

The sampling technique is based on the type of operationalisation applied. During the literature review, we found several papers in which only one end of the relationship was asked to indicate perceptions (pure or antagonistic monadic operationalisation). Brennan et al. (2003) call this single-end sampling. In other articles, sampling was based on the perceived dyadic operationalisation, quasi two-sided sampling. Real two-sided sampling, based on the real dyadic operationalisation, was also present in literature. Papers measuring trust/trustworthiness in a real dyadic approach can be further categorised according to the number of informants involved in the survey and the way sampling is actually carried out. Svensson (2006) distinguished between one-to-one and multiple informants sampling. Both were identified during our literature review. In the former case, only one key informant, while in the latter case, several informants on both sides are involved in measurement. A specific type of one-to-one sampling is pairwise sampling. Here, two key informants representing the two sides of a specific relationship indicate perceptions in relation to the concrete partner as a person (the representative of the company). Pairwise sampling can also be carried out in the physical presence of the informants, making measurement highly concrete and situational.

(4) Type of applied statistics: all of the papers in the review applied classic statistics. Using traditional statistical techniques for analysing dependencies between two variables in the context of specific relationships (pairs) may create four common errors (Gonzalez – Griffin 2000). Let us assume that N pairs have evaluated the perceived level of trust/trustworthiness in a survey. This means that in traditional terms, we have $2N$ data points. The so-called assumed independence error occurs when this $2N$ is interpreted as the sample size and analysed using classic statistical techniques. The deletion error is present when N data points of the above-mentioned $2N$ are left out because we want to avoid the assumed independence error. Although this error will not always bias the statistical results, e.g. actual correlations, it is still a waste of analytical power to drop half of the data. Cross-level error is committed when researchers calculate the mean scores for two aligned data points of a pair and use it in further classical statistical analysis (widely used in ongoing research). Depending on the degree of interdependence within dyads, these may result in false interpretations. Last, but not least, the levels of analysis error should also be avoided because correlations between dyad means cannot be interpreted as dyad level effects, while correlations between individual scores do not indicate individual level effects.

As mentioned already, the highest concreteness of dyadic operationalisation and analysis can be achieved by applying pairwise sampling, a special case of real two-sided, one-to-one sampling. In this case, the two cohesive informants of a given business relationship are called pairs. In statistical terms, the two scores given by these informants to the same variable represent one observation. (In our own research setting, this is the two levels of perceived trustworthiness of the two persons in a concrete pair representing a concrete business relationship.) In dyadic data analysis, these aligned data pairs are called dyads. In mathematical terms, these aligned data pairs define a vector. The special technique of dyadic data analysis aims at measuring statistical constructs between such vectors (Kenny et al. 2006). The special approach of dyadic data analysis makes it possible to overcome the above-mentioned analytical errors. It offers statistical constructs for analysing both individual and dyad level effects within relationships. It is capable of capturing individual effects, for example, the effect of the perceived level of trustworthiness of a partner on his/her other relational perceptions (e.g. on commitment). It can also capture dyad level effects, e.g. the extent to which mutuality in perceived levels of trustworthiness in a relationship influences other relational characteristics (e.g. commitment) in the same dyad.

Along the above-described attributes, we have developed the state of the art methodological profile (*Table 1*) of survey-based trust related literature. This profile indicates that these research projects can be characterised with a low level of situational concreteness; they still rely on single-end or quasi dyadic sampling, and exclusively on traditional statistical constructs. In our research, we aim to overcome the shortcomings of this methodology and apply situational analysis, pairwise sampling, and dyadic data analysis.

4. A SITUATIONAL ANALYSIS OF TRUST USING PAIRWISE SAMPLING AND DYADIC DATA ANALYSIS

Both trust and trustworthiness are dyadic phenomena that cannot effectively be analysed using single-end research (Brennan et al. 2003), monadic or quasi dyadic operationalisation (Henneberg et al. 2009), and traditional statistical tools, especially not in the context of mutuality. To overcome the limitations of this state of the art research methodology, we have analysed concrete situations and applied pairwise sampling and dyadic data analysis (Ickes – Duck ed. 2000). Our paper does not want to provide an in-depth presentation of dyadic data analysis; we only aim to highlight the basic differences compared to the traditional sampling and mathematical-statistical concepts, and to introduce tools directly relevant to our research hypothesis. Therefore, after a short introduction to the methodology,

Table 1. Research profile of state of the art methodology in trust-related and survey-based empirical researches

Methodological characteristics	Level of concreteness			Sampling technique					Type of statistics	
						Real two sided sampling				
Articles	General relational analysis	Concrete relationship analysis	Concrete situation	Single-end sampling	Quasi two-sided sampling	One-to-one informants	Multiple informant	Pair-wise sampling	Classic statistics	Dyadic data analysis
Zineldin – Jonsson 2000		x	–	x					x	
Handfield – Bechtel 2002		x	–	x					x	
Brashear et al. 2003	x		–	x					x	
Dyer – Chu 2003		x	–			x			x	
Farrelly – Quester 2003		x	–			x			x	
Izquierdo – Cillán 2004		x	–				x		x	
Kvon – Suh 2004	x		–		x				x	
Ryssel et al. 2004	x		–	x					x	
Gountaris 2005		x	–	x					x	
Leung et al. 2005	x		–	x					x	
Svensson 2005		x	–			x			x	
Gao et al. 2005	x		–	x					x	
Barnes et al. 2005		x	–				x		x	
Ulaga – Eggert 2006		x	–	x					x	
Svensson 2006		x	–			x	x		x	
Zhao – Cavusgil 2006		x	–			x			x	
Caceres – Paparoidamis 2007	x		–	x					x	
Erikkson – Laan 2007	x		–	x					x	
Kingshott –Pecotich 2007	x		–	x					x	
Liu et al. 2009		x	–					x	x	
Nielsen – Nielsen 2009	x		–	x					x	
Panayides – Lun 2009		x	–	x					x	
Yeung et al. 2009		x	–	x					x	
Wagner et al. 2010		x	–	x					x	
Davis et al. 2011		x	–	x					x	
Jiang et al. 2012		x	–	x					x	

Source: Author's own compilation.

we describe the empirical research conducted. A detailed description of the statistical background of dyadic analysis – this relatively new statistical toolset – is given in the works of Gonzalez – Griffin (2000) and Kenny et al. (2006).

In case of a dyadic data analysis, two coherent scores – a vector – specify one observation related to the analysed phenomenon, the perceived levels of trustworthiness in our case, and analytical tools try to capture statistical relationships between these vectors. Dyadic data always contain a mix of dyad and individual level information. Separating these two levels "requires an approach that explicitly identifies and models the degree of interdependence within and between variables at each level of analysis" (Gonzales – Griffin 2000: 183). Pairwise sampling is suggested because it helps researchers to think in a structured way about processes and effects in concrete dyads, and makes it possible to ask questions at both the dyad and the individual levels. The method applies double entry coding (Gonzales – Griffin 2000). Double entry is a tool that transforms the 2x*N* matrix of observations developed by pairwise sampling into a 2*N* vector. This data transformation makes it possible to use standard statistical programme packages in our examinations.

Dyadic data analysis can be applied for exchangeable and also distinguishable cases. These two cases necessitate different statistical solutions for further analysis. The so-called dyadic homogeneity analysis is necessary to decide whether a case is exchangeable or distinguishable. In dyadic data analysis, homogeneity analysis is a means to test whether two respondents in the pair have a similar or different answers to a given question. We have conducted this analysis and found that our cases are exchangeable (Gonzales – Griffin 2000), consequently the ICC and APIM dyadic regression models suggested could have been applied.

As mentioned in the introduction, our research hypothesis is as follows: in a business relationship characterised by mutually high levels of trustworthiness perceived by each counterpart, the willingness to be involved in risky situations is higher than in relationships in which actors do not mutually believe that their partners are highly trustworthy. In these cases, mutually high levels of trustworthiness act as a governance mechanism, and trust appears in the relationship. The above hypothesis is empirically analysed in situations in which sensitive information is to be shared between actors, creating risk and vulnerability in the relationship.

To test our hypothesis, we had to apply the dyadic regression analysis developed for exchangeable cases. These models are the ICC (Intraclass Correlation Coefficient Model) and the APIM (Actor-Partner Interdependence Model) model (Gonzalez 2010). These models analyse how one or more variable (the independent variables of the regression model) determine the value of a dependent variable. In our analysis, the dependent variable was the willingness to act in a risky

situation (trust), specifically the willingness to share risky information with a partner (and his/her organisation). The independent variables were related to the perceived levels of trustworthiness in specific pairs.

The regression models of dyadic data analysis are special because they can incorporate several effects into the regression function: the actor and the partner effect (ICC model). APIM is even more complex because it also incorporates the so-called mutual effect, which is the effect of mutuality in the perceived levels of a given relational attribute between concrete partners in a pair. These effects are interpreted as follows:

(1) actor effect: effect of the partner's trustworthiness as perceived by the actor in a dyad on the actor's willingness to share information with the partner,
(2) partner effect: effect of the actor's trustworthiness as perceived by the partner in a dyad on the actor's willingness to share information with the partner, and
(3) mutual effect: effect of mutuality in the above-perceived levels of trustworthiness on the actor's willingness to share information with the partner.

Because our hypothesis does stress mutuality in the perceived levels of trustworthiness, our expectations were that only results using the APIM model will support our hypothesis. The mathematical formula for the APIM model is as follows:

$$Y = \beta_0 + \beta_1 \cdot X + \beta_2 \cdot X' + \beta_3 \cdot X \cdot X',$$

where Y is the dependent variable, and the values of β_0, β_1, β_2 and β_3 are regression values. X and X' are independent variables, the two perceived levels of trustworthiness in a given dyad. Predictor X represents the actor's influence on the actor's Y; predictor X' represents the partner's influence on the actor's Y. The product $X{\cdot}X'$ is a new independent variable indicating the mutual effect of these levels on the dependent variable (Kenny et al. 2006).

The ICC model is different from APIM only in the respect that it does not incorporate the mutual effect (Gonzalez 2010).

We have developed a questionnaire, which was used during sample development. Respondents were asked to evaluate:

- the perceived level of trustworthiness toward his/her concrete partner in the pair, and
- the perceived level of trustworthiness toward the partner's company as an organisation.

(The original scale was –3 to +3 and has been recorded into a 1–7 Likert scale.)

As already mentioned, trust between persons and organisations are closely related, but nevertheless different concepts (Anderson – Narus 1990). There are only a limited number of papers studying these differences (Swan – Nolan 1985; Young – Wilkinson 1989). We expected that our empirical research will enrich the body of knowledge in this respect too, since our questionnaire not only asked respondents to indicate the level of perceived trustworthiness toward his/her concrete partner as a person, but also the perceived level of trustworthiness toward the company represented by this person.

Next, we asked our informants to indicate whether they are willing to share with their pairs the following types of information (yes/no):

- operational information related to transactions with your partner (e.g. order volumes, due dates, inventory levels),
- operational information related to other, third-party companies,
- information related to future innovations and strategic actions, and
- financial information concerning your company (e.g. cost level, profit margin).

Similarly to the level of trustworthiness, informants had to indicate

- whether they were willing to share risky information with their concrete partner in a pair, but also
- their willingness to share this information with another hypothetical representative of the partner's firm.

We organised several workshops with purchasing and logistics professionals – two typical boundary spanning professionals in supply chain types of business relationships – and asked them to complete our questionnaire using pairwise sampling. This data gathering was carried out in the physical presence of respondents, but in an anonymous way. Concrete answers were neither visible nor accessible to the participants in order to avoid biases in responses. We gathered 96 pairs of questionnaires, with 192 dyadic data points.[1]

The workshops started with pairwise sampling. We did not discuss any of the concepts in the questionnaire (trust, trustworthiness, or risk). Only after sampling did we allow our respondents to evaluate the four concrete information sharing situations. They indicated that sharing operational information is a must and is

[1] The situations under investigation are virtual in nature. Real-life situations are analysed using a qualitative approach, mainly case studies. This methodology has the advantage of high reliability, but it also has limitations, its generalisability for example. Mathematical-statistical constructs are strong in this latter aspect. This is the reason why we have chosen the survey-based statistical methodology and have tried to map the limitations of current techniques. Behavioural economics can also be used for modelling our problem. But behavioural game theory has the same limitations in this respect. They are used in laboratory environments and virtual situations.

therefore not associated with any type of risk. They did not associate real risk either with sharing third-party information or innovation-strategic-related information; only sharing financial information was perceived by the respondents to be a situation associated with a high level of risk.

5. RESULTS

In our empirical analysis, 32 dyadic regression functions were developed. These functions differed along the following dimensions:

- whether the ICC or the APIM model has been applied,
- the built-in independent variables: the type of the partner in the analysis, or whose perceived trustworthiness has been evaluated: the concrete partner as a person in the pair or the company the person was representing,
- the dependent variable: the type of the partner with whom the information sharing situation was tested: with the actual partner as a person in the pairwise sampling process or another hypothetical representative of the company for which the actual partner in the pair was working, and
- four information sharing situations characterised by different levels of risk.

According to our expectations, applying the ICC model – which does not systematically build into the model the effect of mutuality – will not support the hypothesis. This expectation was backed by our empirical results: no significant regression models using the ICC method could have been developed.

We asked our informants to indicate the willingness to share risky information with both the concrete person in his/her pair, but also with other, hypothetical employees of the company represented by these persons. The former tested trust in an interpersonal, the latter in an organisational context. In both cases, the mutually high level of perceived trustworthiness led to the appearance of trust; partners were willing to engage in a situation with high level of risk, namely sharing financial information.

As mentioned, informants indicated that real risk is associated only with the situation of sharing financial information. This was the only situation in the research that needed relational governance. Therefore, we expected that results will be supportive only when regression models are related to this type of situation. This expectation was also fulfilled: the regression models were never significant when situations with low levels of associated risk were analysed. However, regression models related to the situation of financial information sharing were significant and the R^2 values were also supportive. These regression models were

Table 2. Characteristics of the 32 regression models developed with a focus on the APIM model

Numbers of the regression models Characteristics of these models		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	From the 17th to the 32nd regression models applying the ICC model. …
(1) Type of dyadic regression model	ICC regression model																	
	APIM regression model	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
(2) Whose perceived levels of trustworthiness were measured	Trustworthiness of the person	x	x	x	x					x	x	x	x					
	Trustworthiness of the company					x	x	x	x					x	x	x	x	
(3) The context of trust (personal or organisational)	Information sharing with the person	x	x	x	x	x	x	x	x									
	Information sharing with the company (other, hypothetical employee)									x	x	x	x	x	x	x	x	
(4) Concrete situations analysed	Sharing operational information	x				x				x				x				
	Sharing third-party information		x				x				x				x			
	Sharing innovation-related information			x				x				x				x		
	Sharing financial information				x				x				x			x		

4 and 8 (*Tables 2* and *3*). Since regression models 4 and 8 were both satisfactory and differed only in respect of whose perceived trustworthiness was measured (the person's or the company's in general), we developed a 33rd regression model that incorporated both types of perceived trustworthiness (*Table 3*). The model was also significant and resulted in the highest R^2 value.

Table 3. Key results

No. of models	Dependent variable	Independent variables of the regression functions	Value of R^2	Significance* of the regression model
Perceived level of trustworthiness of the partner as a person – APIM – information sharing with the partner as a person				
4.	InfoFinancial1	Trustworthiness1 Trustworthiness2 TrustworthinessMutual	0.207	Significant
Perceived level of trustworthiness of the partner's firm – APIM – information sharing with the partner as a person				
8.	InfoFinancial1	TrustworthinessFirm1 TrustworthinessFirm2 TrustworthinessFirmMutual	0.272	Significant
Perceived level of trustworthiness of both the partner as a person and the partner's firm – APIM – information sharing with the partner as a person				
33.		Trustwothiness1 Trustwothiness2 TrustwothinessMutual TrustwothinessFirm1 TrustwothinessFirm2 TrustwothinessFirmMutual	0.302	Significant

Note: * $p < 0.01$.

6. DISCUSSION AND CONCLUSION

Our paper aimed to test the following hypothesis: in business relationships characterised by mutually high levels of trustworthiness, the willingness to be involved in risky situations is higher than in relationships in which the actors do not believe that their partners are highly trustworthy. In situations characterised by mutually high levels of trustworthiness, it actually acts as a governance mechanism: trust appears in the relationship and risky situations are willing to be taken. The hypothesis was empirically analysed using survey-based research methodology in situations where sensitive information was to be shared between partners, creating the perception of risk and potential vulnerability.

Empirical results supported this hypothesis, having direct managerial relevance. This means that building mutually high levels of trustworthiness is a rewarding investment because it may help in governing risky situations inevitably emerging in business relationships. According to our results, trust can only be detected when mutuality is present. The absence of a mutually high level of trustworthiness does not generate trust and so may lead to the deterioration of the partnership. In today's turbulent environment, characterised by globalisation, the intense outsourcing of important capabilities and constant innovation and knowledge sharing, such risky situations arise day by day.

Trust has a rich literature and is widely expected as an important relational characteristic that has a positive effect on both relationships' and firms' competitiveness. So what is new in our findings? An important element of our hypothesis was the mutuality in the perceived levels of trustworthiness. Mutuality is also often stressed in trust-related literature (Ivens 2004), but only scarcely ever conceptualised and analysed systematically in survey-based empirical research projects. The literature also points out that any relational characteristics should be analysed in a concrete dyadic setting (Brennan et al. 2003; Henneberg et al. 2009). Unfortunately, research methodology is lagging behind requirements in this respect too. Based on a literature review of 26 trust-related publications, we have developed a state of the art methodological profile. This profile showed that empirical research is never really specific in respect of the analysed situation, and sometimes even analysed relationships fail to be specific. It still relies on single-end research, only very seldom applies real dyadic operationalisation, and uses traditional statistical constructs. The empirical results of studies with such a methodological profile are biased and can be questioned.

Our survey-based empirical research tried to overcome these methodological limitations. We carried out a highly situational research and applied a real dyadic operationalisation and analysis. We used the pairwise sampling method and the dyadic data analysis that has been developed in order to capture interdependences between partners in relationships – including the issue of mutuality. Pairwise sampling was already applied in business setting, but to the best of our knowledge, dyadic data analysis had lacked such an application. In this respect, our paper is unique. It tries to fill the methodological research gap outlined with the state of the art methodological profile developed. Qualitative case studies and experimental economics fulfil the requirement of situational and dyadic analysis. But extended survey-based empirical research is needed in order to develop knowledge that is reliable and generalisable at the same time. Therefore, we believe that any paper focusing on methodological challenges, discussing methodological developments, and highlighting potential solutions is important.

The research described and the results presented raise four methodological – but also theoretical – issues:

(1) Does mutuality really matter in relationship management?

(2) Does analysing trust or any other relational attribute really need a dyadic operationalisation?

(3) To what extent is trust as a governance mechanism situational?

(4) Is interpersonal trust the same as interorganisational trust?

We developed 33 regression models altogether. Of these 33 models, only those have led to supportive results

- that have systematically incorporated into the regression model the effect of mutuality in the perceived levels of trustworthiness,
- were related to the only situation characterised with high level of risk and vulnerability, specifically the situation of information sharing, and
- where the dependent variable of the model was related to information sharing with the actual person in the pair during the pairwise sampling and not the company in general this partner person was representing.

Our empirical results confirm the statement that only situations associated with a high level of risk and potential vulnerability are suitable to detect trust and to analyse the role of trustworthiness in relationship governance. Situations where real risk is not present do not necessitate relational governance. Therefore, analysing relationships (even specific ones) in general is not appropriate when trust/trustworthiness is a key concept of the research model.

In our survey, we measured separately the perceived level of trustworthiness of the concrete person in a pair and the level of trustworthiness perceived toward the company in general. In both cases, regression models were significant when perceived levels of trustworthiness were mutually high and the situation associated with a high level of risk was analysed. This result indicates that it does not seem to be a distinguishing feature whose trustworthiness is measured, a person's or generally the company's. But it does seem to matter with whom the risky situation has to be handled. High levels of mutual trustworthiness perceived toward the partner and also toward his/her firm can facilitate risky information sharing with the concrete person, present during pairwise sampling. Noone was willing to share financial information with other representatives of the partner firm under any circumstances. These surprising results indicate that research on relational characteristics have to devote more effort into understanding differences between interpersonal and interorganisational settings.

The paper tried to focus on the methodological challenges of today's trust-related survey-based research practice. The situational character of the research, measuring mutuality in a systemic way using real dyadic operationalisation and analysis were all present in our survey-based research project. We hope we were able to draw attention to these methodological problems, make some suggestions, and enhance further thinking.

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