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Examining the Link between the Governance Mechanisms and Supply Chain Performance — an Empirical Study within the Triadic Context

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ABSTRACT

The goal of the research is twofold. First, it aims to reveal the basic modes of governance run by the manufacturer across the examined triadic supply chains. Secondly, the paper compares the groups of triadic supply chains, applying certain modes of governance, including network governance, in terms of the relational benefits and supply chain performance. To investigate the relationship between network governance and the supply chain performance, the Principal Component Analysis (PCA) with Varimax Rotation was used, followed by the cluster analysis and non-parametric tests. The study showed that the triadic supply chains significantly differentiate in terms of the modes of governance. Further findings also indicated that the triadic supply chains that follow the network governance mode consider their performance to be significantly higher in comparison to the supply chains that do not run this type of governance mechanism. Firstly, the research showed that it is difficult to unequivocally reveal the pure mechanisms of governance, undistorted by the influence of another distinct mode in the triadic supply chains. On the contrary, they are more or less influenced by other modes of governance distinguished in the literature. Likewise, it is also important to highlight that the mechanism of governance is inseparably bound with a certain dyadic relationship established between two actors in the wider structure of supply chains. The study also showed that incorporating a clan as a social mechanism of governance together with a market and hierarchy results in increasing the relational benefits and overall performance for both dyads in the triadic supply chains.

KEY WORDS

network governance, triads, supply chain

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Introduction

Supply chain governance is perceived as a mechanism of coordination encompassing three distinct modes, namely, market, hierarchy and clan. A market mechanism involves the coordination mediated by a price mechanism, while a hierarchy concerns a supervisory structure to impose integration and apply bureaucratic routines, and a clan is anchored social capital which is a tacit resource attainable by individual actors through the networks of relationships. Apart from these three distinct modes, several studies increasingly investigate the issue of network governance indicating a simultaneous coexistence of these three modes (Dooley and Gubbins, 2019; Cardoso de Oliveira et al., 2019; Yeoman and Santos, 2019). Accordingly, the notion of network governance

underscores the role of informal social exchange systems together with the hierarchical structures within firms and formal contractual relationships between them, to coordinate the supply chain activities (Ahi and Searcy, 2013; Czakon, 2012; Jones et al., 1997). In other words, network governance encompasses the set of instruments to coordinate participating organisations and deliver certain outcomes (Grandori and Soda, 1995; Dyer and Singh, 1998). In our study, we seek to investigate whether network governance affects the value of relational benefits and the overall supply chain performance, as compared to the non-network based, distinct governance mechanisms. The goal of our research is twofold. First, it aims to reveal the basic modes of governance run by the manufacturer across the examined triadic supply chains. Secondly, the paper compares the groups of triadic supply chains, applying certain modes of governance, including network governance, in terms of the relational benefits and supply chain performance.

Our study makes two general contributions to the supply chain theory and practice. First, it simultaneously investigates three mechanisms of governance: market, hierarchy and clan in supply chains. Though the extant studies consider this issue, they do not take the full advantage of investigating the co-existence of the three mechanisms of governance. On the contrary, they mostly considered only two out of three mechanisms, and this does not contribute to drawing a full picture of governance in supply chains (Bradach, 1997; Cannon et al., 2000). Likewise, there is a paucity of research investigating the triadic structures of supply chains. The previous studies most often referred to the "ego-perspective" by examining the focal actor orchestrating the supply chain, thus omitting the perspective of other partners establishing this structure. Consequently, to challenge this issue, our study is conducted within the triadic context and investigates three subsequent actors (supplier–manufacturer–customer), forming the basic structure of a supply chain.

The paper consists of several parts. Following the introduction, the literature review offers the theoretical framework for the research methodology. Next, the findings of the analysis are presented, followed by the discussion and conclusions of the research.

1. Literature review

From the classical perspective of the Relational Contracting Theory and Transaction Cost Analysis (TCA), governance is viewed as the choice between market and hierarchy (Williamson, 1985). Market constructs revolve around contractual relationships over property rights. A market construct involves relationships mediated by a price mechanism and provides a high degree of flexibility to the companies in determining their willingness to form supply chains. Essentially, the market construct argues that companies prefer to be independent and will choose to collaborate only when they see particular advantages to themselves (Powell, 1990). In other words, this form of governance resembles new market-based relationships, characterised by arm's-length ties, deprived of both personal bonds and any form of central coordination of activities (Baker, 1990). The hierarchical construct of governance is positioned on the opposite side of the continuum. It is supposed to overcome the problems of non-engaged and loose relationships typical of market governance. Therefore, the construct of hierarchy emphasises a necessity to impose a supervisory structure and apply bureaucratic routines. It specifically refers to the level of control determined by explicit rules, procedures and standards that establish the rights and obligations of actors in supply chains (Choi and Hong, 2002). In this way, hierarchy assumes that the companies are more engaged in the established and committed long-lasting relationships (Lowndes and Skelcher, 1998; Pilbeam et al., 2012). However, on the other hand, it may reduce flexibility and innovation due to the higher level of formalisation and centralisation of power (Powell, 1991).

Beyond the recognition of market and hierarchy as a mutually exhaustive bipolar framework of governance, there have been numerous attempts to develop alternatives or supplement the existing model with other characteristics (Uzzi, 1996). Subsequent debates enabled to develop one of the most widely accepted approaches, which added a third construct of network governance to this bilateral framework (Coleman, 1988). In time, a discussion unfolded as to whether network governance was simply a combination of market and hierarchy constructs, or whether it would be better understood as a unique form of governance. In early works, network governance had been framed as a form combining the tenets of both market and hierarchy and positioned somewhere in the middle of the continuum between these two extreme forms of governance (Thorelli, 1986). In other words, the gap between market and hierarchy was filled with this third form of governance. Nonetheless, the current view usually acknowledges that a network is a dis-

tinct, non-market and non-hierarchical, and, thus not an intermediate form of governance, possessing complementary, multi-relational and reciprocal characteristics (Powell, 1990; Tachizawa and Wong, 2015). The current understanding of network governance highlights that purely economic exchanges may be shaped by social capital which is a tacit resource attainable by individual actors through the networks of relationships (Whipple et al., 2015). In other words, social capital creates opportunities for economic exchanges of goods which are difficult to price and enforce contractually (Uzzi, 1996). Therefore, the particular form of network governance will be, at least, partially anchored in the discretion of supply chain decision-makers, based on managers' previous experience, perception capability, mimicry, personal attitude (Provan and Kenis, 2007), professional background, opportunism, ambiguity, information accessibility etc. In light of the above, market and hierarchy are supplemented with clan structures, where all members of the transactional network share the social norms of the particular group (Dorsey, 2014). A clan as a distinct mode of governance has been found to have benefits relative to other — market and hierarchical — governance structures (Lund, 2003). A clan highlights a team-centred approach, establishing respectful relationships among the supply chain partners. Consequently, it encourages a win-win situation to the members in the supply chain (Sambasivan and Ching, 2010). Consequently, we consider network governance as a mechanism whose sine qua non is constituted by the simultaneous presence of all three modes, namely, market, hierarchy and clan.

As depicted in Fig. 1, network encompasses three distinct modes, i.e., market, hierarchy and clan, which form diverse configurations of governance (Thompson et al., 1991). In this vein, Heide (1994) compared network governance to a plural system established indirectly by means of "bringing the governance properties of one form to bear on another". Hence the following hypothesis: H1: Triadic supply chains significantly differentiate in terms of the modes of governance.

We argue that establishing network governance favours generating relational benefits that are not obtained by defeating another company (Zacharia et al., 2009; Bowersox et al., 2003). On the contrary, the relational benefits refer to the win-win situation where the multiple supply chain actors are winners (Dyer and Nobeoka, 2000; Joshi and Campbell, 2003). However, though relational benefits highlight the significance of reciprocal relationships and symmetrical exchange of the resources between two firms, it is still anchored in bilateral arrangements established between dyads. Therefore, despite its novelty, to make the full use of the relational approach in supply chains, there is a need to look beyond the dyad (Kannan and Tan, 2010; O'Leary-Kelly and Flores, 2002; Frohlich and Westbrook, 2001). Wasserman and Faust (1994) argue that a dyadic perspective cannot fully explain relational behaviours of two firms in the network. In other words, the companies in supply chains establish relationships not only with each other but also with the same third parties. Consequently, many companies are linked indirectly by third parties (Granovetter, 1985; Granovetter, 1992). Therefore, a triad — which is the smallest unit of network (Choi and Wu, 2009) — the next logical step after having studied dyadic relationships. In the opinion of Dubois and Fredriksson (2008), the existence of three actors linked to one another through three connected relationships is a starting point for the analysis of triads. In our study, we investigate the triads taking the form of triadic supply chains with the manufacturer as a focal actor located in the middle between the supplier and the customer.

In light of the above, moving the level of analysis from dyadic to triadic structures is an important step towards considering the more complex dynamics of supply networks (Wilhelm, 2011). In the same vein,

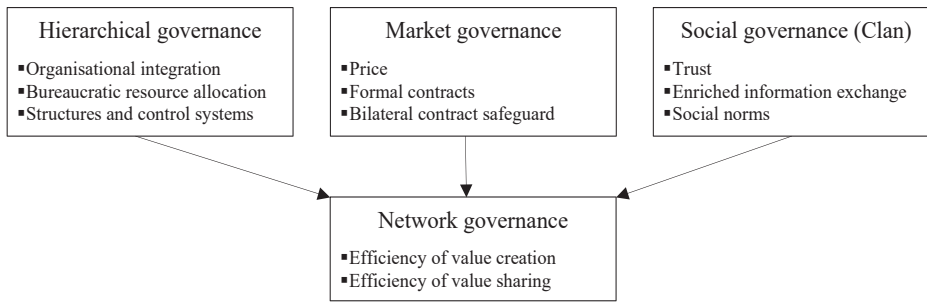

Fig. 1. Network as a plural form of governance
Source: (Czakon, 2012).

Lamming et al. (2000) posit that the articulation of supply networks, as an extension of supply chains, seeks to accommodate and explain the complexity associated with the creation and delivery of goods and services from the source of raw materials to their destination in end-customer markets. Consequently, a triadic research perspective becomes imperative to further comprehend network dynamics in supply chains (Choi and Wu, 2009) and is instrumental when investigating their relational benefits (Colotla et al., 2003).

The notion of relational benefits underscores the necessity of rejecting the short-sighted way of perceiving advantages as a temporary profit, with the supply chain leader being the only beneficiary, frequently at the expense of other partners. Instead, the relational benefits call for covering the aspirations and goals of all companies involved in achieving and sustaining advantages. Thus, we assume that the intensity of leveraging external resources among companies may lead to perceived inequity in the short term, but in the long run, it may have a positive effect on the strength of relational benefits with the triadic supply chains. This brings us to the following hypothesis: H2: Triadic supply chains that follow the network governance mode consider their supply chain performance to be significantly higher in comparison to the supply chains that do not run this type of governance mechanism.

2. Methodology

2.1. Sample and Research Instrument

The process of data gathering spanned over five months from December 2018 through May 2019, and consisted of several stages, adapted from Wu et al. (2010). Generally, we used a multiple-respondent approach to collect data for the study. To gather data from all three actors of the triadic supply chain, we combined methods based on probability and non-probability sampling. The method of stratified sampling was firstly applied to obtain information from the manufacturers (small, medium and large), while the snowball sample method was employed to collect data from the suppliers and the customers. In the first stage of the data collection process, a sample of 98 Polish manufacturers was targeted. Out of this number, a group of ten companies refused to fill in the questionnaire maintaining that their suppliers or customers would not be willing to participate in this research. Likewise, a large group of 50 manufacturers encountered problems with a negative attitude of suppliers or customers towards the questionnaire. Finally, a group of four manufacturers managed to encourage their suppliers and customers to participate in the survey; however, after receiving the questionnaire, they refused to take part in the research. Consequently, the study investigated the remaining number of 34 triads that established a simultaneous relationship with both a supplier and a customer.

The structure of the survey questionnaire was adapted to certain groups of respondents — actors playing different roles in the examined triadic supply chains. Accordingly, depending on the function served in the triad, each responding company answered a specific set of questions. Due to its central location, the manufacturer answered the questions concerning different modes of governance in the upstream and downstream dyad (categories 4–6 in Appendix A) and the relational benefits separately for both dyads — one formed with its supplier, and the other one established with its customer (category 1 in Appendix A). The other two groups of triad actors, the suppliers and the customers, answered the questions concerning governance and the relational benefits yielded in a certain dyad formed with the manufacturer — categories 1 and 4–6 (Appendix A), respectively. In addition, the group of customers was asked to answer the questions concerning the customer-focused performance to measure customer satisfaction derived from the service offered by the triadic supply chain (category 3 in Appendix A).

2.2. Measures

This study measured all items on a five-point Likert scale. Based on the prior studies, five indicators were identified demonstrating the extent, to which both parties in the particular dyad generated reciprocal effects (Salas et al., 2015; Kim and Choi, 2015; Whipple et al., 2015; Carter et al., 2017). The obtained responses from both actors in a dyad were then captured as averaged scores indicating the relational performance of upstream (supplier–manufacturer) and downstream (manufacturer–customer) dyads. To demonstrate the supply chain performance, we applied six opinion-based measures dealing with customer-focused performance. It allowed to capture the role of the market as the ultimate mechanism for determining supply-chain performance. This group covers issues connected with quality performance, delivery and flexibility performance, such as respon-

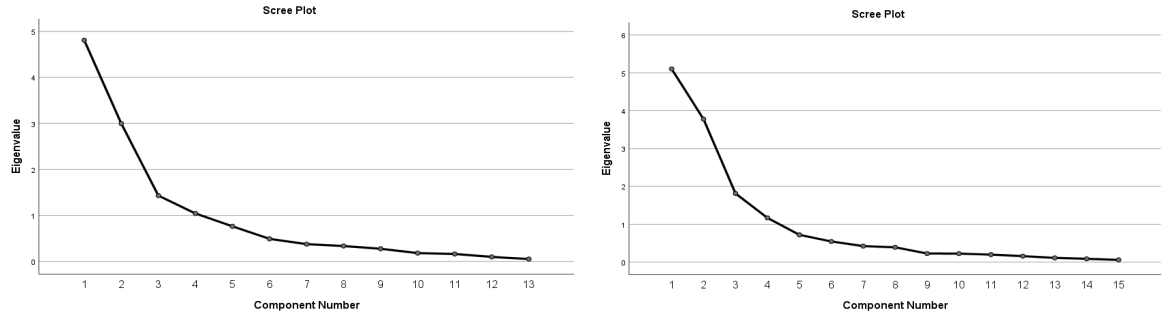

Fig. 2. Scree plots within two groups of variables (left for the upstream dyad, right for the downstream dyad)

siveness to customer requests or unexpected challenges, on-time delivery, delivery reliability, accuracy (Gligor and Holcomb, 2012). Finally, we used three groups of measures to indicate the price mechanism, hierarchical structures and clan. Building upon previous research, we identified a set of five indicators demonstrating the price mechanism anchored in the market form of governance (Noordewier et al., 1990; Wang, 2002; Mirkovski et al., 2016), a group of six indicators manifesting hierarchy (Eccles et al., 1992; Grant, 1996; Jones et al., 1997; Ashenbaum et al., 2009) and a class of four indicators reflecting a clan (Mesquita et al., 2008; Liu et al., 2009).

2.3. Research Methods

To investigate the relationship between network governance and supply-chain performance, a statistical analysis has been performed. In the first step, the variables indicating certain modes of network governance, the relational benefits and the supply chain performance were reduced using the Principal Component Analysis (PCA) with Varimax Rotation to highlight the main underlying multi-item orthogonal constructs. In the second step, the factor scores obtained using the PCA were used as criteria for classifying the sample into homogenous groups. As a classification method, we used a cluster analysis with a two-step approach recommended by Ketchen and Shook (1996). Accordingly, we used hierarchical cluster analysis to determine the number of clusters, followed by K-means cluster analysis to perform a group profiling and make necessary comparisons of the obtained clusters.

To identify the basic modes of governance in the investigated supply chains, the PCA was initially carried out in two groups of 15 variables each, which manifested network governance of both upstream and downstream dyads. The inspection of anti-image correlation matrix in the first group of variables resulted in eliminating one item, whose measure of individual sampling adequacy was below the nominal cut-off point of 0.5. In addition, one variable was dropped for its moderate exploratory relevance, as indicated by the factor loading that did not exceed 0.6 (Kline, 1994). In the second group, all variables were accepted for further analysis demonstrating satisfying values of individual sampling adequacy and factor loadings. Based on the analysis of the scree plot (Fig. 2) and eigenvalues of least 1 for each factor, the analysis showed a clean factor-loading pattern with minimal cross-loadings, and high loading on the one construct.

The results of PCA for both variables revealed a four-factorial solution, covering a total of 13 variables in the first group and 15 variables analysed in the second group, respectively (Tab. 1). In the group of variables manifesting network governance of the upstream dyad, one may enumerate the following four constructs: two constructs of hierarchical governance (HUD1 and HUD2), market governance (MUD) and a clan (CUD). None of the two constructs of hierarchical governance is entirely pure in terms of the modes of governance, as they consist of one variable initially qualified as the one characterising market mode of governance (HUD1), and a clan (HUD2). In the group of variables manifesting the network governance of a downstream dyad, PCA produced the following four constructs: market–clan governance (M-C_DD), two constructs of hierarchical governance (HDD1 and HDD2), and market governance (MDD). Similar to the previous analysis, the same variable indicating the market governance was classified into hierarchical governance (HDD1). Interestingly, most variables manifesting clan and market governance were qualified to the same construct (M-C_DD). This probably stems from the fact that these two sets of variables go hand-in-hand. More specifically, the autonomy offered by market governance favours the development of unconstrained social bonds among the companies in the investigated supply chains.

The rotation of PCA was converged in seven and six iterations for the first and second group, respectively. Likewise, the obtained factors explain 79.06, 79.05 percent of the total variance in the first and second groups of variables, respectively, which is an excellent result. To check the internal consistency of extracted constructs, we calculated the Cronbach's alpha coefficients which indicated satisfying level of at least 0.7 for each construct.

Apart from the factors manifesting the modes of governance, we also used the PCA with Varimax Rotation to extract the underlying factors of relational benefits and supply-chain performance. They were employed to make a profile of the investigated supply chains. The analysis performed in the space of two sets of variables manifesting the relational benefits of upstream and downstream dyads showed a clear pattern of a two-factorial solution with the factor loadings above 0.6 and a measure of individual sampling adequacy, derived from the anti-image matrices, above the nominal cut-off point of 0.5. The first construct was composed of variables indicating the relational benefits of the upstream dyad, while the second one embraced the variables of the relational benefits of the downstream dyad. Similarly, the PCA conducted in the space of variables manifesting the supply chain performance produced a one-factorial solution with loadings exceeding 0.6, individual sampling adequacy above 0.7, and a high value of total variance explained (82.9 percent).

The factor scores for network governance, obtained from the PCA, were applied in the second step of the analysis as clustering criteria to split the sample. At first, to determine the number of clusters, hierarchical cluster analysis with Ward's partitioning method and squared Euclidean distance were performed. The Ward's method attempted to minimise the sum of squares of any hypothetical clusters, which can be formed at each step. To determine the optimal number of groups, we used a dendrogram to display dissimilarity levels between clusters. The heights of the links represent the distance, at which each fusion was made, such that a greater dissimilarity between the objects indicated a greater distance between them and a taller link (Montalbano and Nenci, 2014). The optimal number of groups was derived by comparing the coefficients in the agglomeration schedule, Fig. 3, recommended as one of stopping rules (Everitt et al., 2001). As depicted in Fig. 3, the highest difference between the coefficients can be observed when two clusters are derived; however, as we intended to conduct a more in-depth analysis, a higher number of clusters was required. Ultimately, as a result of hierarchical cluster analysis for further investigation, we decided to apply three clusters, as this solution indicates the second-highest difference in the values of coefficients.

Tab. 1. Rotated Component Matrices (left for the upstream dyad, right for the downstream dyad)

	Component			
	HUD1	HUD2	MUD	CUD
MUD_1			0.896	
MUD_2			0.715	
MUD_4			0.805	
MUD_5	0.870			
HUD_1	0.856			
HUD_2	0.790			
HUD_3	0.774			
HUD_4		0.716		
HUD_5		0.827		
HUD_6		0.867		
CUD_1		0.791		
CUD_2				0.781
CUD_3				0.819

	Component			
	M-C_DD	HDD1	HDD2	MDD
MDD_1				0.895
MDD_2	0.778			
MDD_3	0.756			
MDD_4	0.842			
MDD_5		0.802		
HDD_1		0.853		
HDD_2		0.910		
HDD_3		0.611		
HDD_4			0.856	
HDD_5			0.848	
HDD_6			0.849	
CDD_1	0.749			
CDD_2	0.659			
CDD_3	0.891			
CDD_4	0.930			

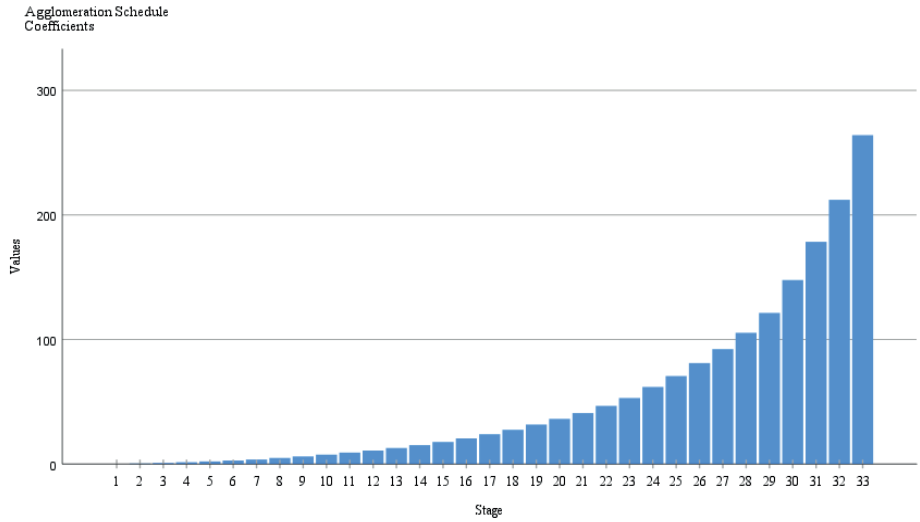

Fig. 3. Agglomeration schedule coefficients

Three clusters were used to carry out K-means cluster analysis to assign each case to the appropriate cluster. The criterion of the cluster membership was the minimal Euclidean distance between each case and the classification centre represented by a centroid (cluster centre). To additionally validate the obtained results of clustering, the outcome of K-means cluster analysis was compared with the class assignment obtained from the hierarchical cluster analysis. Based on the results of two partition methods, the contingency table was constructed, and the Rand index was calculated (Tab. 2).

The measure of agreement showed that 74.8 percent pairs of objects are placed in the same class. It means a high level of agreement and confirms the correct choice of K-means cluster analysis as the leading clustering method (Krieger and Green, 1999). The obtained clusters contain a diverse share of the research sample. Cluster 1 includes 26 percent of the sample; cluster 2 consists of roughly 56 percent, while cluster 3 covers 18 percent of the sample.

3. Research results and discussion

As demonstrated by the study, it is difficult to unequivocally reveal pure mechanisms of governance, undistorted by the influence of other distinct modes. For instance, the same two variables, typical for market governance (Market_5) belong to hierarchical governance in both upstream and downstream dyads. It may partially stem from the fact that this variable ("my company keeps reminding our partner that it can be easily replaced if it does not offer good deals"), can be either successfully qualified as the indicator of hierarchy. Likewise, in the case of governance applied in the upstream dyad, one variable typical for clans was included in the hierarchical mode of governance. The obtained finding extends the study of Bradach and Eccles (1991) who alluded that the constructs of market, hierarchy and social capital are not sole ideal types; quite the contrary,

Tab. 2. Contingency table

		K-means Cluster Analysis			Total
	Clusters	1	2	3	
Hierarchical Cluster Analysis	1	11	12	0	23
	2	0	5	2	7
	3	0	0	4	4
Total		11	17	6	34

Tab. 3. Kruskal-Wallis H Test for the network governance constructs in three clusters

	HUD1	HUD2	MUD	CUD	M-C_DD	HDD1	HDD2	MDD
Kruskal-Wallis H	6.490	15.305	14.183	5.368	10.805	2.965	8.185	17.475
df	2	2	2	2	2	2	2	2
Asymp. Sig.	0.039	0.000	0.001	0.068	0.005	0.227	0.017	0.000

they are intertwined and combined in various ways. Also, it is worth noting that the modes of governance tend to overlap across the dyads. Most often, there are at least two of them combined in each dyad. This finding is also confirmed by Lowndes and Skelcher (1998) who argued that in reality, a set of organisational arrangements is often associated with a variety of governance modes. At times, they might be similar in the triadic supply chains because the manufacturer, as a focal company, can transfer some experiences derived from one dyad (e.g. upstream) into another dyad (e.g. downstream). To determine statistically significant differences in the latent variable scores between the three group, the Kruskal Wallis H test was used. It allowed to compare the governance mechanisms across three clusters and validate their significance (Tab. 3).

As depicted in Tab. 3, two out of eight constructs (i.e. CUD and HDD1) turned out to be insignificant at $p < 0.05$. Consequently, we eliminated these two constructs from further analysis. Fig. 4 depicts the final cluster centres obtained from the network governance constructs. The remaining set of six constructs of governance mechanisms in the upstream and downstream dyads significantly differentiate three clusters. In the light of the obtained findings, we argue that in the case of the investigated supply chains, the hierarchical mode of governance prevails in both dyads. Specifically, two constructs of hierarchy were extracted in both dyads, while clan, if extracted as a sole construct, is insignificant or combined with the market mechanism. This clearly shows that control and hierarchy still dominate in shaping the relationships in the examined organisations. The obtained clusters can be then characterized in terms of the intensity of the modes of governance. In clusters 1 and 3, one may observe a significant difference between the modes of governance demonstrated in both upstream and downstream dyads. More specifically, cluster 1 indicates a moderate level of hierarchy and market in the upstream dyad and a strong market level in the downstream dyad. On the other hand, cluster 3 demonstrates a strong hierarchy and market in the upstream dyad and a strong hierarchy, market and a clan in the upstream dyad.

Cluster 2 highlights a moderate level of hierarchy in both dyads. Consequently, we consider the triadic supply chains in cluster 1 to particularly run market governance, the supply chain in cluster 2 to apply low hierarchy governance, and, finally, the organisations in cluster 3 to use network governance, due to the presence of all three modes of governance. In light of

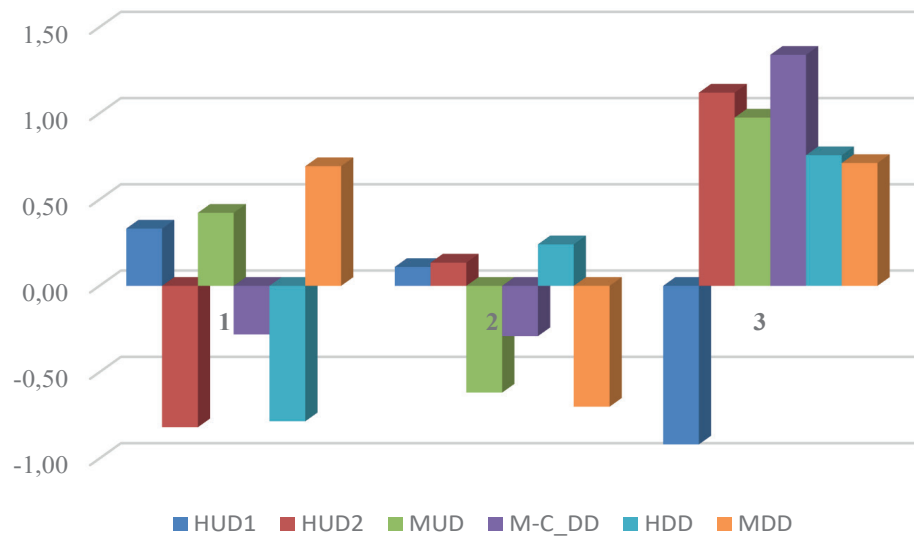

Fig. 4. Characteristics of clusters regarding the intensity of network governance

the above, the study lends support to H1 by showing that the triadic supply chains significantly differentiate in terms of the modes of governance at $p < 0.05$. Further on, we tested whether the investigated supply chains with network governance gained higher supply chain performance. First, we conducted the Mann-Whitney U tests to make necessary comparisons across three clusters in terms of relational benefits yielded by each dyad (Tab. 4).

Tab. 4 shows that the cluster of supply chains running market governance and low hierarchical governance do not significantly differentiate in terms of relational benefits, yielded both in the upstream and downstream dyads. Interestingly, the third cluster of supply chains that applies network governance demonstrates significant differences (at $p < 0.01$) as compared to the remaining two groups. Specifically, the triadic supply chains with network governance produced significantly higher mean ranks of 13.67 and 14.00 as compared to the group applying market governance in the upstream and downstream dyads, respectively. Similarly, a comparison between two clusters — one gathering the supply chains with network governance and the other one including the organisations running low hierarchical governance — demonstrates that the first class indicates more positive attitude towards relational benefits (mean ranks of 18.83 and 19.17 in the upstream and downstream dyads, respectively) as compared to the latter group (Tab. 5).

Consequently, incorporating clan as a social mechanism of governance with the market and hierarchical coordination systems results in increasing the relational benefits for both dyads in the triadic supply chains. In this vein, our study complements the findings of Capaldo (2014) who investigated the extent of knowledge benefits produced by the network governance mechanism. Finally, together with the relational benefits yielded in dyads, we also tested whether the clusters of triadic supply chains significantly differentiated in reference to the overall supply-chain performance. In general, the results of Kruskal-Wallis test statistics showed that the value of supply chain performance significantly differentiated all three clusters (at $p < 0.01$, Tab. 6).

More notably, an in-depth comparison of each pair of two clusters was obtained using the Mann-Whitney U tests. The results showed that the cluster applying market governance as well as the group implementing low hierarchical governance did not significantly differentiate in terms of the supply-chain performance (at $p < 0.05$, Tab. 7).

Nonetheless, the third cluster, gathering the triadic supply chains with network governance, significantly differs from two other groups: at the significance level $p < 0.003$ for the group running market governance and at $p < 0.002$ for the class with low hierarchical governance. As depicted in Tab. 8, the study demonstrates higher ranks of 13.83 and 19.33 for the performance in supply chains with net-

Tab. 4. Mann-Whitney U test statistics for clusters

Cluster		Relational benefits in the upstream dyad	Relational benefits in the downstream dyad
Market governance - Low hierarchical governance	Mann-Whitney U	80.000	67.000
	Wilcoxon W	146.000	133.000
	Z	-0.635	-1.247
	Asymp. Sig. (2-tailed)	0.525	0.212
Market governance - Network governance	Mann-Whitney U	5.000	3.000
	Wilcoxon W	71.000	69.000
	Z	-2.814	-3.017
	Asymp. Sig. (2-tailed)	0.005	0.003
Low hierarchical governance - Network governance	Mann-Whitney U	10.000	8.000
	Wilcoxon W	163.000	161.000
	Z	-2.871	-3.011
	Asymp. Sig. (2-tailed)	0.004	0.003

Tab. 5. Mann-Whitney U test ranks for clusters

Cluster		N	Mean Rank	Sum of Ranks
Relational benefits in the upstream dyad	Market governance	11	13.27	146.00
	Low hierarchical governance	17	15.29	260.00
	Total	28		
Relational benefits in the downstream dyad	Market governance	11	12.09	133.00
	Low hierarchical governance	17	16.06	273.00
	Total	28		
Relational benefits in the upstream dyad	Market governance	11	6.45	71.00
	Network governance	6	13.67	82.00
	Total	17		
Relational benefits in the downstream dyad	Market governance	11	6.27	69.00
	Network governance	6	14.00	84.00
	Total	17		
Relational benefits in the upstream dyad	Low hierarchical governance	17	9.59	163.00
	Network governance	6	18.83	113.00
	Total	23		
Relational benefits in the downstream dyad	Low hierarchical governance	17	9.47	161.00
	Network governance	6	19.17	115.00
	Total	23		

Tab. 6. Kruskal-Wallis Test Statistics for three clusters

	Supply Chain Performance
Kruskal-Wallis H	11.203
df	2
Asymp. Sig.	0.004

	Cluster	N	Mean Rank
Supply Chain Performance	Market governance	11	16.18
	Low hierarchical governance	17	14.06
	Network governance	6	29.67
	Total	34	

Tab. 7. Mann-Whitney U test statistics for clusters

Cluster		Supply Chain Performance
Market governance - Low hierarchical governance	Mann-Whitney U	79.000
	Wilcoxon W	232.000
	Z	-0.683
	Asymp. Sig. (2-tailed)	0.494
Market governance - Network governance	Mann-Whitney U	4.000
	Wilcoxon W	70.000
	Z	-2.922
	Asymp. Sig. (2-tailed)	0.003
Low hierarchical governance - Network governance	Mann-Whitney U	7.000
	Wilcoxon W	160.000
	Z	-3.081
	Asymp. Sig. (2-tailed)	0.002

Tab. 8. Mann-Whitney U test ranks for clusters

Cluster		N	Mean Rank	Sum of Ranks
Supply Chain Performance	Market governance	11	15.82	174.00
	Low hierarchical governance	17	13.65	232.00
	Total	28		
	Market governance	11	6.36	70.00
	Network governance	6	13.83	83.00
	Total	17		
	Low hierarchical governance	17	9.41	160.00
	Network governance	6	19.33	116.00
	Total	23		

work governance, as compared to the clusters running market governance and low hierarchical governance, respectively. This may suggest that significantly higher performance is produced in the triadic supply chains running network governance. In light of the above, the obtained findings lend support to H2. In line with the results, the triadic supply chains, which follow network governance, consider the supply chain performance to be significantly higher in comparison to the supply chains that do not run this type of governance mechanism.

Conclusions

This study firstly aimed to test whether the triadic supply chains significantly differentiated in terms of the modes of governance. The analysis of the relationship between network governance and the supply chain performance produced especially interesting outcomes. Specifically, we conclude that it is difficult to unequivocally reveal the pure mechanisms of governance, undistorted by the influence of other distinct modes. Consequently, the examined modes of governance tend to overlap across the dyads. Most often, as demonstrated in our study, there are at least two of them combined in each dyad. Regarding the specific content of governance mechanisms, we argue that in the case of the investigated supply chains, the hierarchical mode of governance prevails over the remaining two in both dyads. Likewise, we also posit that the mechanisms of governance might be similar across both dyads in the triadic supply chains, as the manufacturer, being the focal company, can transfer some experiences derived from one dyad (e.g. upstream) to another dyad (e.g. downstream).

Secondly, we sought to examine whether the triadic supply chains that followed network governance considered their supply chain performance to be significantly higher in comparison to the supply chains that did not run this type of governance mechanism. As depicted in our research, incorporating a clan as a social mechanism of governance with the market and hierarchical coordination systems resulted in increasing the relational benefits for both dyads in the triadic supply chains. The obtained findings also showed that together with the relational benefits yielded in dyads, the clusters of triadic supply chains significantly differentiated in reference to the overall supply chain performance. More specifically, we concluded that significantly higher performance was yielded in the triadic supply chains running network governance. In other words, the triadic supply chains, which apply network governance, consider their supply chain performance to be significantly higher in comparison to the supply chains that do not run this type of governance mechanism.

The findings obtained in the study contribute to the theory and practice of supply-chain management. Firstly, the research showed that it is difficult to unequivocally reveal the pure mechanisms of governance, undistorted by the influence of other distinct modes in the triadic supply chains. On the contrary, they are more or less influenced by the other modes of governance distinguished in the literature. Likewise, it is also important to highlight that the mechanism of governance is inseparably bound with the certain dyadic relationship established between two actors in the wider structure of supply chains. Consequently, in the triadic structure of supply chains, composed of two dyads, one may distinguish two relatively distinct modes of governance, while one sole mechanism of governance that dominates over

the others cannot be distinguished. Quite the opposite, at times, in case of triadic supply chains, the mechanisms can become similar, as they are usually orchestrated by the same focal company, in our study, the manufacturer. Nevertheless, among all three modes of governance, hierarchy seems to play the most important role in coordinating the supply chain activities. Understandably, the study showed that incorporating a clan as a social mechanism of governance, together with market and hierarchical, results in increasing the relational benefits for both dyads in the triadic supply chains. Our research also found that higher performance can be obtained in the triadic supply chains that run network governance as compared to other modes of governance.

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APPENDIX A. An Excerpt of the Questionnaire

Categories	No.	Abbreviation	Question
Please rate the relational performance of a dyad with reference to company B in each of the following areas: (1—'strongly disagree', 3—'neutral', 5—'strongly agree')			
1. Relational benefits of upstream / downstream	1.1.	RB_UD_1/ RB_DD_1	Two companies are more profitable or more competitive together than they would have been alone
	1.2.	RB_UD_2/ RB_DD_2	The benefits derived from the combination must be greater than the capabilities of each individual
	1.3.	RB_UD_3/ RB_DD_3	Working with B has allowed overcoming some problems, and thus derive substantial benefits for the dyad
	1.4.	RB_UD_4/ RB_DD_4	Sharing opinion and discussion with B often lead to increased benefits for both actors of the dyad
	1.5.	RB_UD_5/ RB_DD_5	The ongoing costs of coordination of a dyadic relationship are balanced by its benefits
Please rate your customer-focused performance to measure customer satisfaction in each of the following areas: (1—'strongly disagree', 3—'neutral', 5—'strongly agree')			
2. Supply chain performance	2.1.	SP_1	The customers are satisfied with the product quality
	2.2.	SP_2	The customers are satisfied with the product conformance to the market expectations
	2.3.	SP_3	The customers are satisfied with the product volume/variety/flexibility
	2.4.	SP_4	The customers are satisfied with manufacturing efficiency
	2.5.	SP_5	The customers are satisfied with the product development cycle time
	2.6.	SP_6	The customers are satisfied with the response to changes in manufacturing
Please rate mechanisms of network governance with reference to company B in the following areas: (1—'strongly disagree', 3—'neutral', 5—'strongly agree')			
3. Market	3.1.	MUD_1/MDD_1	The price is a predominant factor that determines my collaboration with B
	3.2.	MUD_2/MDD_2	My company is very active in searching for new partners who can potentially substitute B
	3.3.	MUD_3/MDD_3	My company can easily switch to another partner, dropping out of the collaboration with B
	3.4.	MUD_4/MDD_4	The goods delivered by my company to B can be easily delivered by my competitors
	3.5.	MUD_5/MDD_5	My company keeps reminding our partner that it can be easily replaced if it does not offer good deals
4. Hierarchy	4.1.	HUD_1/HDD_1	My company very actively interferes in the operations performed by B
	4.2.	HUD_2/HDD_2	My company controls B using certain formal methods
	4.3.	HUD_3/HDD_3	My company would be exposed to high costs when switching from B
	4.4.	HUD_4/HDD_4	My company provides B with formal guidelines concerning how to solve problems and/or deal with disruptions
	4.5.	HUD_5/HDD_5	My company resolves ongoing disputes with B by referring to clauses in signed contracts
	4.6.	HUD_6/HDD_6	My company tends to closely monitor opportunistic behaviours of partner B, such as ignorance of responsibilities, price inflation, late deliveries and partial information disclosure
5. Clan	5.1.	CUD_1/CDD_1	My company strives to build trust and a sense of community by organising meetings and training to encourage B to be empathic and have a mutual understanding
	5.2.	CUD_2/CDD_2	My company maintains a discussion with B concerning all relevant issues of its operations and strategy
	5.3.	CUD_3/CDD_3	My company keeps trying to develop trust with B
	5.4.	CUD_4/CDD_4	Disruptions in collaboration with B are productively resolved in the spirit of mutual understanding