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# Managing Russian agri-food supply chain networks with power

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## Abstract

The importance of power is underlined by many scientists who view it as a key behavioural construct. Power distinguishes itself as an effective tool in coordinating and promoting harmonious relationships, solving conflicts, and enhancing performance. An important challenge is to find out what role power plays in managing supply chain networks, paying specific attention to its effects on coordination and cooperation. The aim of our work is to investigate the role of power in supply chain networks in order to work out a strategy that enables supply chain managers to select an effective mix of power mechanisms. We critically examine the existing literature and elaborate on the role of power in supply chain relationships. We work out and test a theoretical model of the effects of power on cooperation and coordination and discuss possible managerial implications of using power as an effective tool for promoting supply chain management. To verify our research hypotheses we conducted semi-structured in-depth expert interviews via telephone about relationships of international food processing companies with their suppliers in Russia and tested the model using the Partial Least Squares (PLS) approach. Depending on the origin of power, it may have different effects on cooperation and coordination. Based on the results of the survey we worked out a special ranking system for the use of power depending on its expected effect on coordination and cooperation. Expert power has the highest ranking among the other types of power for improving coordination. Therefore, we recommend using this strategy as a first priority for improving coordination. The data in our PLS analysis represent only a single perspective in the dyad: food processing companies. Gathering data from other companies' perspectives, such as retailers or agricultural producers, could have produced different (presumably more realistic or complete) findings. Our study offers recommendations for managers about the use of different types of power in managing the Russian agri-food supply chains, with specific attention paid to coordination and cooperation issues. In order to manage supply chain networks successfully, knowledge of different types of power is essential. The developed ranking of different types of power according to their effects on coordination and cooperation is designed to help managers make the right decisions in choosing the appropriate type of power for coordination purposes.

**Keywords:** power, supply chain networks, supply chain management, Russia, agri-food business

## 1. Introduction

Today many retail and processing companies earn a significant share of their revenue in international markets. Since foreign direct investments most often demand higher quality and have significant influence in the food sector, they can be regarded as a powerful source of structural changes in transition countries. It is observed that going abroad retailers as well as branded food processors export their supply chain management concepts into new markets, both in the sense of enhanced efficiency as well as in the sense of global chain quality concepts, having a serious impact on the whole food chain. Besides, due to the tightening of quality standards and the need to work together with suppliers, one of the main consequences of retail internationalization is the establishment of tightly coordinated chain organizations

(Hanf *et al.*, 2010). The resulting need to steer and manage such chain organizations, also called supply chain networks, could be viewed as one of the most important trends in the Russian agri-food business.

In this connection the increasing attention in the literature to the role of power in supply chains and marketing channels has been observed lately (Hingley, 2005; Kumar, 2005; Sodano, 2006). The importance of power is underlined by many scientists who refer to power as a key behavioural construct that influences performance, as an integrator that coordinates the supplier firms and their distributors (Wilkinson, 1979), and as a factor that plays a significant role in the supply chain (Cox, 1999, 2001a; Maloni and Benton, 2000). Several studies on marketing channels have shown that channel power has significant impact on the buyer-supplier relationship and

performance in channel distribution (Etgar, 1976; Skinner *et al.*, 1992) and that the power relationship has implications for the development of partnerships, as the structure of the power-dependence relationship determines the performance outcomes (Frazier and Antia, 1995).

Therefore, there is a need to investigate this phenomenon in order to close the existing gap in the literature and to contribute to overall understanding of the role of power in supply chain networks. An important challenge, therefore, is to find out what role power plays in supply chain networks and how it affects supply chain management (SCM), particularly coordination and cooperation, and whether power can be utilized as a tool to promote overall supply chain effectiveness. Therefore, the aim of our work is to investigate the role of power in supply chain networks in order to work out a strategy that enables supply chain managers to select an effective mix of power mechanisms. For that we critically examine the existing literature and elaborate on the role of power in supply chain relationships. We work out and test a theoretical model of the effects of power on cooperation and coordination and discuss possible managerial implications of using power as an effective tool for promoting SCM.

## 2. Theoretical background

### Cooperation, coordination and power in supply chains

Many authors agree that cooperation among supply chain members is a necessary precondition for effective SCM (Ellram and Cooper, 1990; Mentzer *et al.*, 2001). Spekman *et al.* (1998) represented an opinion that cooperation refers to a rudimentary information exchange and is not a sufficient condition for managing supply chain relationships. Cooperation represents a point of departure from short-term spot-market operations towards bilateral and multilateral exchange. Problems of cooperation arise from conflicts of interest. However, even after the interests and strategies of the actors have been aligned, the problems of coordination may still remain (Hanf and Dautzenberg, 2006). This is due to the fact that the core task of achieving cooperation through motivation can be successfully fulfilled, leaving the problems of aligning actions unattended. Thus, solving problems of cooperation does not automatically help to achieve coordination (Gulati and Singh, 1998).

Whereas cooperation problems are rooted in motivation, coordination problems may arise due to the limited knowledge of participating actors about how others will behave in situations of interdependence. Some authors point out that problems of coordination emerge due to

the lack of accurate information about the decision rules that others are likely to use (Geanakoplos, 1992; Milgrom and Roberts, 1992; Theuvsen, 2004). It is necessary to direct and coordinate supply chain activities throughout the whole network, since a supply chain network can only be efficiently aligned by a sophisticated management concept (Bogaschewsky, 1995). Therefore, special effort should be put on solving the problems and tasks of coordination among actors, since it represents the top success factor for SCM. In our view, power could represent the most effective means of solving problems of coordination and cooperation through exerting influence on other supply chain members and could be intentionally used as a vehicle to transport the strategy of the focal firm.

A great many authors who have studied power agree to the point that there seems to be a problem in defining it (Bierstedt, 1950). Encouraged by statements about the complexity and multi-faceted nature of power found in the literature, we have attempted to shed light on this matter by examining power in the context of various theoretical backgrounds. Different theories see the world through different lenses; and this is also noticeable in the ways they deal with the concept of power (Table 1; Belaya and Hanf, 2009).

We found that most theories, regardless of the strand of science they originate from, agree that when one has power he or she has access to more material resources (such as financial resources and physical comforts) as well as social resources (such as higher esteem, praise, and positive attention). When someone has low power he or she is subject to more social and material threats, especially the threat of losing favour among the powerful. Among the various definitions of power there are subtle nuances, but the definitions generally seem to represent attempts to capture the idea that power has something to do with the way one affects or has the capacity to affect others in a direction which is compatible with his or her own wishes or preferences. Having examined the different perspectives of power we conclude that the various definitions of power in different sciences resemble each other though they are applied in different contexts. Power is present everywhere – in human relations, society and state, channels and networks. One point is clear: the one who possesses power over another possesses the ability to cause that party to do something that it would not otherwise have done. We conclude that power generally refers to the ability, capacity or potential to get others to do something, to command, to influence, to determine or to control the behaviours, intentions, decisions or actions of others in the pursuit of one's own goals or interests despite resistance, as well as to induce changes.

**Table 1. Selected theories dealing with the concept of power (adapted from Belaya and Hanf, 2008)<sup>1</sup>.**

Theory	Area of origin	Author	View of power
Social exchange theory	Economics, Psychology, Sociology	Homans (1958)	A's power over B is the extent to which A can affect B's behaviour (through exchange).
Rational choice theory	Sociology, Philosophy, Political Economy, Economics, Micro-economics	Scott (2000)	A's power over B is the greater, the less resources or wealth the first exchanges with the second.
Network exchange theory	Sociology	Lovaglia <i>et al.</i> (1995)	Power of A over B is the potential of A to obtain favourable outcomes at B's expense.
Status value theory	Sociology	Thye (2000)	Power is a structural potential that can be exercised to extract resources.
Elementary theory	Sociology	Willer and Anderson (1981)	Power emerges when actors in exchange relations have alternative exclusive payoffs that differ.
Actor-network theory	Social sciences	Callon (1986), Latour (2005)	Power is relational; it is not associated with a particular institution, but with practices, techniques, and procedures.
Power-dependence theory	Sociology	Emerson (1962)	Power of A over B is equal to, and based upon, the dependence of B upon A.
Resource-dependency theory	Sociology, Political Science	Pfeffer and Salancik (1978)	Power is based on the control of resources that are considered strategic within the organization.
Equi-dependence theory	Sociology	Cook and Yamagishi (1992)	Actor <i>i</i> 's structural power is defined as the maximum profit <i>i</i> can get from any of his or her partners.
Strategic contingencies theory	Sociology, Strategy	Hickson <i>et al.</i> (1971)	Power of a subunit relates to its coping with uncertainty, substitutability, and centrality.
Field theory	Psychology, Sociology	Lewin (1951)	Power of A over B is defined as the quotient of the maximum force that A could (or possibly could) induce on B and the maximum resistance that B could offer.
Event-structure theory	Psychology, Sociology, Behavioural sciences	Tannenbaum (1962)	Power of A over <i>a</i> is the probability that <i>a</i> does <i>x</i> in response to A's request minus the probability that <i>a</i> would do <i>x</i> without A's request.

<sup>1</sup> In this table we have attempted to generalize the views on power offered by some theories within the economic, sociological and psychological strands of sciences.

Many authors agree that investigating power in buyer-supplier relationships is of great importance for understanding supply chain issues and that power represents a very important issue for supply chain networks and marketing channels (Chatziaslan *et al.*, 2005; Cook and Emerson, 1978; Cox, 2004; Cox *et al.*, 2004; Ireland, 1999), since it is considered to be a driver for improved networking and better performance (Omta, 2002). Cox (2001b) stated that collaboration is not the only mechanism available for managing suppliers under all circumstances and that power can be used very effectively to achieve a better deal between buyers and suppliers in supply chains. Therefore, the ability to use power in order to influence other supply chain actors

distinguishes itself as an excellent tool in coordinating and promoting harmonious relationships, solving conflicts, and enhancing performance of the whole network and its members. The biggest advantage of using power could be its commanding nature, which is perfectly suited for completing specific tasks in SCM. In this context, we posit that power can be considered to be one of the strongest and influential tools for SCM.

### Theoretical model and hypotheses

However, in order to discuss the effects of power on SCM, one needs to be specific about the nature of power. French

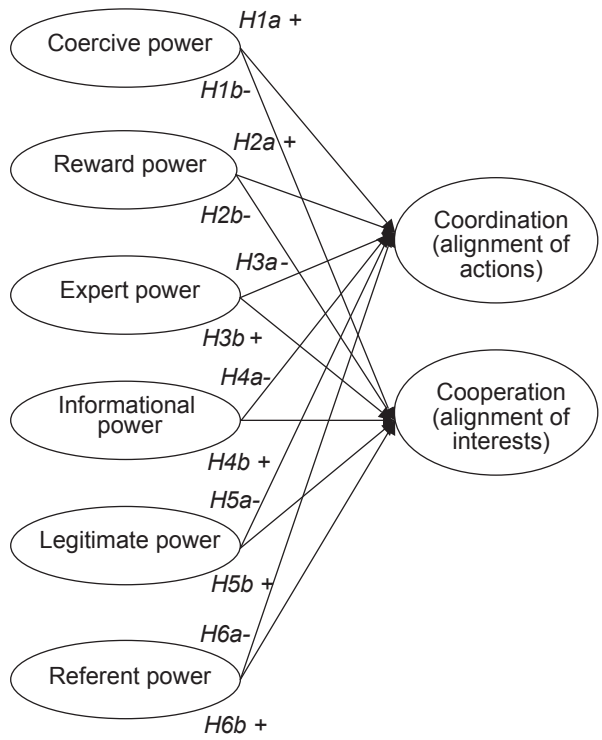
and Raven (1959) expressed the view that the actual effect of power will depend on its type: coercive, reward, expert, legitimate, referent power (French and Raven, 1959) or informational (Raven and Kruglanski, 1970) (Table 2).

Proceeding further we develop the theoretical model of the effects of power on cooperation and coordination and formulate research hypotheses H1a-H6b, paying specific attention to cooperation and coordination issues (Figure 1).

Researchers agree that the frequent use of power to force a partner into action will lead to the exploitation of the target (Bannister, 1969; Robicheaux and El-Ansary, 1975), which is seen as detrimental for the quality of the relationship (Gellynck *et al.*, 2011; Stolte and Emerson, 1976; Thompson, 1967). Hunt and Nevin (1974) indicated that coercive power is related positively to intrachannel conflict and inversely to dealer satisfaction, whereas non-coercive power exhibits the opposite relationship. Exercising coercive power over other members of the supply chain might have short-term benefits for the focal organization, but it reduces its success in the long-term (Cousins, 2002). However, Stern and El-Ansary (1992) asserted that channel members may use power to determine who will undertake which marketing activities, coordinate the performance of these tasks, and manage conflict among themselves. Hamner and Organ (1978) suggested that punishment is one of the most readily available means for shaping (and maintaining) the behaviour of subordinates. Other authors viewed coercive power as a mechanism for allowing relatively stable relationships to develop between cooperating social actors (Bachmann, 2001; Stern and El-Ansary, 1992).

*Within a supply chain network, the perceived use of coercive power will positively affect coordination (H1a) and negatively affect cooperation (H1b).*

Gaski (1986) stated that it is through reward and coercive power that partner perceptions are managed to create harmonious and enduring relationships. If the use of power is based on genuine rewards, the supplier will be willing to accept them and enter a trustful relationship. If a retailer continuously uses reward power to give rewards to its suppliers who comply with its quality standards and deliver on time, it can promote cooperation and generate trust in this relationship. Assuming that reward power provides extrinsic motivation, which drives suppliers to comply



**Figure 1. Theoretical model of the effects of power on coordination and cooperation.**

**Table 2. Different types of power (adapted from French and Raven, 1959; Raven and Kruglanski, 1970).**

Coercive power	Ability to influence decisions, actions and intentions of others through punishing for noncompliance
Reward power	Ability to influence decisions, actions and intentions of others through compensating for compliance
Expert power	Ability to influence decisions, actions and intentions of others through superior skills, knowledge, expertise, qualifications and abilities
Informational power	Ability to influence decisions, actions and intentions of others through valuable, new and up-to-date information
Legitimate power	Ability to influence decisions, actions and intentions of others through the legitimate right to make demands, and expect compliance and obedience from others
Referent power	Ability to influence decisions, actions and intentions of others through attractiveness, worthiness, amiability, respect from others



with the requirements, in order to achieve favourable outcomes (Zhao *et al.*, 2008), it will have a positive effect on coordination. However, the overly frequent use of reward power is likely to damage relational norms (Boyle *et al.*, 1992) and cooperation (Skinner *et al.*, 1992). Therefore, the exaggerated use of reward power may lead to distrust, suspicion and eventually abstinence from entering into a trustful relationship by a target of influence. If unrealistically high discounts or other offered rewards are unusual for the culture or mentality of the latter, they may be associated with corruption or bad purposes.

*Within a supply chain network, the perceived use of reward power will positively affect coordination (H2a) and negatively affect cooperation (H2b).*

Expert power is considered to be less effective than coercive and reward power due to being less flexible and unrelated to the specific performance of supply chain members (Etgar, 1976). In general, the acquisition of special knowledge or technology in order to achieve a powerful position and the use of expert power formed in this way will contribute to the positive development of cooperation within a supply chain relationship. However, expert power is perceived as positive when solicited and given. Offering free advice through an agency and advisory staff as part of project implementation is seen as a valuable incentive for the target of influence to get involved in the project (Davies *et al.*, 2004). Besides, some authors emphasized that consultation and swapping of information might produce expectations of reciprocity and trust (Blau, 1964; Coleman, 1990). Expert power could be most effective as an influence tactic when the objectives of the person being influenced match those of the leader (DuBrin, 2000).

*Within a supply chain network, the perceived use of expert power will negatively affect coordination (H3a) and positively affect cooperation (H3b).*

Gaski (1986) argued that the use of informational power involve manipulative aspects. Stern and El-Ansary (1992) supported the statement that informational power is likely to have a negative effect on coordination in channels of distribution. They argued that channel participants do not necessarily view each other as partners, but rather as rivals. Payan and McFarland (2005) found that information exchange has a lower likelihood of compliance with the requirements of the influencing party due to being the most unfocused type of power. As noted by Eyuboglu and Atac (1991), depending on the channel environment informational power will have different effects on cooperation. Information exchange could have a positive

effect on cooperation, since it not only conforms to, but elevates the level of relationalism between parties (Boyle *et al.*, 1992) and is based on mutual trust (Baldwin, 1971; Raven and Kruglanski, 1970). We assume that in an environment in which participating parties view each other as partners, and not as rivals but rather as allies, informational power will have a positive effect on cooperation, as it helps to build trust, and enhances positive attitudes toward the long-term channel relationship.

*Within a supply chain network, the perceived use of informational power will negatively affect coordination (H4a) and positively affect cooperation (H4b).*

The study conducted by Lee and Low (2008) indicated that legitimate power showed a positive relationship with satisfaction. Effective coordination of exchange relationships has been observed to have a positive effect of legitimate power, as the distribution of power becomes legitimate over time (Frazier and Antia, 1995; Kalafatis, 2000), and a more standardized business format is applied, such as contracts (Jap and Ganesan, 2000; Lusch and Brown, 1996; Mohr *et al.*, 1996). Boyce *et al.* (1992) suggested that in the effective operation of an agreement, it is the spirit rather than the written word that is important. The written word becomes significant when things are going very wrong. According to this statement, legal contracts specifying formal written rules and obligations could be a harder form of legitimate power than cooperative norm, which only refers to 'unwritten' unofficial norms, unofficial values, norms, shared values, rules of conduct, and beliefs that guide actions and behaviours. Regulations and economic incentives play an important role in encouraging changes in behaviour, but although these may change practices, there is no guaranteed positive effect on personal attitudes (Gardner and Stern, 1996).

*Within a supply chain network, the perceived use of legitimate power will positively affect coordination (H5a) and negatively affect cooperation (H5b).*

Since referent power was ranked highest among other types of power in connection to satisfaction (Lee and Low, 2008), and since cooperation has been found to go hand in hand with satisfaction (Gaski, 1986), we suppose that the use of a positive image and good reputation will foster the development of cooperation. Dapiran and Hogarth-Scott (2003) emphasized that cooperation comes about through the use of expert and referent power. Suppliers would also be more willing to comply with the requirements of internationally recognized retailers and fulfill their commands. However, high degrees of identification between

dealers and suppliers may be associated with less channel control. Referent power might not be sufficient to motivate the target to implement certain tasks, since they do not represent an explicit statement of the desired behaviour. Therefore, using it might not be sufficient to animate the target to implement certain tasks.

*Within a supply chain network, the perceived use of referent power will negatively affect coordination (H6a) and positively affect cooperation (H6b).*

### 3. Empirical study of the Russian agri-food business

#### Data, sample and method

To verify our research hypotheses we conducted semi-structured in-depth expert interviews via telephone about relationships of international food processing and retailer companies with their suppliers in Russia from the 31<sup>st</sup> of March till the 17<sup>th</sup> of June 2010. The database for the telephone survey was obtained from The Chamber of Commerce and Industry of the Russian Federation and included 1000 records of contact details for companies of foreign origin registered in Russia as companies operating in the area of food processing in Russia with at least 10% of foreign direct investment capital. We contacted these companies and conducted a total of 97 complete telephone interviews (89 interviews with food processing companies and 8 interviews with retailers). As the group of retailers was quite small, we were able to conduct only 8 interviews with them. For model assessment we deleted retailers from the sample in order to sustain the homogeneity of the units of analysis and avoid biased results. For this reason the response rate represented 8.9%.

We made a thorough selection of the interviewees who were chosen according to their leading positions in order to effectively gather relevant information (Blankertz, 1998; Merkens, 2000; Patton, 1990). Specifically, we employed an expert (concentration) sampling (Fritsch, 2007; Patton, 1990). The persons chosen were in positions with a high level of concentration of appropriate information. The applied technique makes particular sense in view of the above-mentioned research questions. Before contacting the companies from the database we made a thorough pre-test study by contacting 15 experts from the field of agri-food business and conducting telephone conversations with them. This pre-test allowed us to identify potential problems and to revise the proposed questionnaire before starting the actual fieldwork. We started the survey after receiving their feedback and improving the questionnaire.

The questionnaire was designed in three languages (Russian, English and German) in order to allow experts with various language backgrounds to participate in the questionnaire. The interviewees were first informed about the interviews via email. After receiving their consent, the calls were made at the time appointed by the interviewees. The majority of respondents wanted to be treated anonymously and did not give permission for their interviews to be tape recorded; so the interviews were logged in written form.

The survey tool contained three main sections (Section I: Mechanisms for managing agri-food supply chains; Section II: Problems of managing agri-food supply chains; Section III: Information about the interviewee and his or her business partners). The questions were presented grouped according to the thematically connected blocks within each section (see appendix). We applied the four-point Likert scale (e.g. frequency of use of influence strategies: 1 – ‘never’, 2 – ‘seldom’, 3 – ‘often’, 4 – ‘very often’; level of satisfaction with coordination and cooperation aspects: 1 – ‘very dissatisfied’, 2 – ‘dissatisfied’, 3 – ‘satisfied’, 4 – ‘very satisfied’). The answer option ‘don’t know’ was also given in order to increase the reliability of the answers. One of the first questions asked was ‘Do you feel responsible for coordinating the supply chain of this product (“from the field to the fork”)?’ Two answer options were given: ‘yes’ and ‘no’. We selected the focal companies for our research based on answers to this question.

In order to test our model, we used the Partial Least Squares (PLS) technique for Structural Equation Modeling (Wold, 1982) and applied the SmartPLS software 2.0.1 (Ringle *et al.*, 2005). Our decision to use the PLS was motivated by the fact that, in contrast to other Structural Equation Modeling techniques, the PLS avoids small sample size problems and can be used to estimate very complex models with many latent and manifest variables.

#### Results of model assessment

The evaluation of results of the PLS path modelling is accomplished in two steps: (1) the assessment of the measurement (outer) model; and (2) the assessment of the structural (inner) model (Chin, 1998). In our case the measurement model is a reflective one. The outer model was evaluated by examining the individual item reliabilities and convergent validity of the model. The individual item reliabilities were examined through the factor loadings of the items on their respective constructs.

According to Hair *et al.* (2006), an item is considered insignificant and removed from the model if its factor

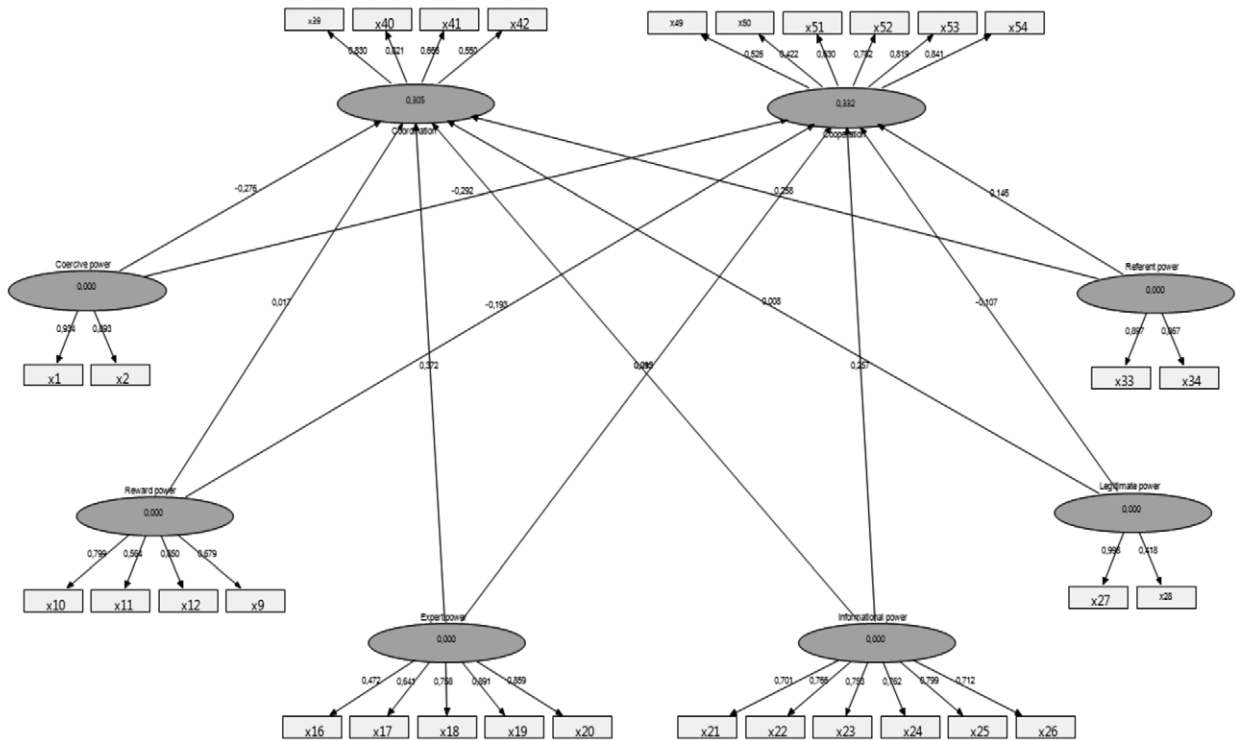


Figure 2. Graphical representation of the model in SmartPLS.

loading is less than 0.4. The remaining indicators represent more than 50% of the share of the variance of each indicator in respect to the corresponding latent variable and can be considered as the most reliable. Based on this criterion we removed 23 indicators from the initial model in order to achieve the indicator reliability for our model (Figure 2).

The internal consistency of the model was assessed by calculating the Cronbach  $\alpha$  and composite reliability (Table 3).

Cronbach's  $\alpha$  is a measure of internal consistency and must not be lower than 0.6. In our case all variables except *Legitimate power* have their Cronbach's  $\alpha$  within the borders of the advised number. Unfortunately, the measure of

Table 3. Results of the assessment of measurement model: Cronbach's  $\alpha$ , composite reliability and average variance extracted.

Latent variables <sup>1</sup>	Cronbach's $\alpha$	Composite Reliability	Average variance extracted
COOR	0.719285	0.813111	0.527487
COOP	0.757797	0.836368	0.473304
CP	0.805315	0.910199	0.835268
RWP	0.734857	0.817823	0.534618
EP	0.807736	0.852956	0.547956
IP	0.846552	0.884829	0.561973
LP	0.523012	0.706973	0.584865
RFP	0.715612	0.875101	0.777990

<sup>1</sup> Abbreviations: COOR – Coordination; COOP – Cooperation; CP – Coercive power; RWP – Reward power; EP – Expert power; IP – Informational power; LP – Legitimate power; RFP – Referent power.



Cronbach's  $\alpha$  for *Legitimate power* is 0.523, which is slightly lower than 0.6. In spite of this fact, the composite reliability is achieved for this variable as it is done for all the other variables. The composite reliability index is more reliable in assessing convergent validity because it takes into account the relative weights of the various indicators in a latent construct while Cronbach's  $\alpha$  assumes equal weights (Gyau and Spiller, 2009). The composite reliability is a measure of internal consistency and must not be lower than 0.6. In our case it is even better, since it is over 0.7.

The convergent validity of the model was assessed by calculating the Average Variance Extracted (AVE) (Fornell and Larckner, 1981). AVE should be higher than 0.5. The variable which does not quite correspond with this rule is *Cooperation*. The measure of AVE for this construct is slightly lower and equals 0.473. AVE value means that a latent variable is able to explain more than half of the variance of its indicators on average.

The next step of our analysis was to evaluate the fit of the structural (inner) model. In order to do that it was necessary to assess discriminant validity by comparing the square root of the AVE with the correlation between the construct and the other constructs (Table 4).

The square root of the AVE should be higher than the correlation between the constructs (Gyau and Spiller, 2009). Besides, the positive sign of the correlation coefficient ( $r$ ) indicates that the construct experiencing the influence of the respective construct increases if the respective construct increases. If the sign is negative, it means that the increase of the first construct causes the decrease of the construct at influence.

The structural model was also evaluated based on the  $R^2$  values and the significance of the path coefficients using the bootstrap method. Usually  $R^2$  values of 0.67, 0.33, and 0.19 can be regarded as substantial, moderate, and weak, respectively (Chin, 1998). In model 1 the constructs *Coordination* and *Cooperation* have the value of  $R^2$  0.305 and 0.332, which considering the complexity of the research model indicate a good fit. The results of the assessment of the structural model are presented in Table 5.

The results indicate an approximate measure of the variance of the construct explained by the latent predictive variable. It is also necessary to test the goodness-of-fit of the path coefficients. In this case we used the method of  $t$ -statistics through resampling (Venaik *et al.*, 2001). In order to test the hypotheses one must quantify the paths' significance (by means of a resampling method) and examine the absolute values of the relationships.

According to Martinez-Ruiz and Aluja-Banet (2009), to assess the significance of path coefficients, standard errors and  $t$ -values may be computed by bootstrapping (200 samples;  $t$ -value  $>1.65$  significant at the 0.05 level;  $t$ -value  $>2$  significant at the 0.01 level). We used the method of bootstrapping (samples = 200) to generate  $t$ -statistics to test the significance levels of standardized path estimates. A result is called statistically significant if it is unlikely to have occurred by chance. Therefore, the criterion of significance represents a statement of how unlikely a result must be, if the null hypothesis is true, to be considered significant. The significance levels according to the results of  $t$ -statistics are denoted as follows: \* = 10% and \*\* = 5%.

According to the results, six out of twelve hypotheses (H1a, H1b, H3a, H3b, H4b, H6a) were significant and four out

Table 4. Correlations of the latent variables and the AVE square roots<sup>1</sup>.

	COOP	COOR	CP	EP	IP	LP	RFP	RWP
COOP	<b>0.687971</b>							
COOR	0.423507	<b>0.726283</b>						
CP	-0.249700	-0.181373	<b>0.913930</b>					
EP	0.375932	0.419556	0.179414	<b>0.740241</b>				
IP	0.372067	0.271215	0.128049	0.580504	<b>0.749649</b>			
LP	-0.306813	-0.248269	0.435816	-0.199264	-0.158320	<b>0.764765</b>		
RFP	0.257241	0.360260	0.086310	0.321386	0.273676	-0.209867	<b>0.882037</b>	
RWP	0.085145	0.231527	0.048065	0.423462	0.384902	-0.295605	0.260505	<b>0.731176</b>

<sup>1</sup> Abbreviations: COOP – Cooperation; COOR – Coordination; CP – Coercive power; EP – Expert power; IP – Informational power; LP – Legitimate power; RFP – Referent power; RWP – Reward power.

**Table 5. Results of the assessment of structural model<sup>1</sup>.**

Hypotheses	Effects of latent variables	t-statistics	Beta (path) coefficients (b)	Correlation coefficient (r)	b*r
H1a	CP → COOR	3.142365	-0.276474**	-0.181373	0.050
H1b	CP → COOP	3.211364	-0.291692**	-0.249700	0.073
H2a	RWP → COOR	0.172568	0.016637	0.231527	0.004
H2b	RWP → COOP	1.476850	-0.193422	0.085145	-0.016
H3a	EP → COOR	3.836822	0.372217**	0.419556	0.156
H3b	EP → COOP	2.418828	0.292702**	0.375932	0.110
H4a	IP → COOR	0.130923	0.014832	0.271215	0.004
H4b	IP → COOP	2.736924	0.257051**	0.372067	0.096
H5a	LP → COOR	0.078643	0.007748	-0.248269	-0.002
H5b	LP → COOP	1.037731	-0.107228	-0.306813	0.033
H6a	RFP → COOR	2.910312	0.257730**	0.360260	0.093
H6b	RFP → COOP	1.588292	0.145881	0.257241	0.038

<sup>1</sup> Abbreviations: COOR – Coordination; COOP – Cooperation; CP – Coercive power; RWP – Reward power; EP – Expert power; IP – Informational power; LP – Legitimate power; RFP – Referent power.

of twelve hypotheses (H1a, H3a, H4a, H6a) did not have the expected sign. The values were significant and the signs were positive for the following hypotheses: H3a, H3b, H4b, H6a. The values were significant, but the expected sign was different for: H1a, H3a, H6a. In cases in which the values are significant and the signs are positive, the model provides the empirical support of hypothesized effects. Therefore,

these hypotheses were supported in our model. If the values are insignificant and the signs are contrary to the assumed effects, the hypotheses are not supported. In our case the values are insignificant and the signs are contrary to the assumed effects for hypothesis H4a. Therefore, these hypotheses were not supported in our model. The results of hypotheses testing are presented in Table 6.

**Table 6. Results of hypotheses testing<sup>1,2</sup>.**

Hypotheses	Effects of latent variables	Expected sign	Obtained sign	Supported/Not supported
H1a	CP → COOR	+	-	not supported
H1b	CP → COOP	-	-	supported
H2a	RWP → COOR	+	+	<i>supported</i>
H2b	RWP → COOP	-	-	<i>supported</i>
H3a	EP → COOR	-	+	not supported
H3b	EP → COOP	+	+	supported
H4a	IP → COOR	-	+	<i>not supported</i>
H4b	IP → COOP	+	+	supported
H5a	LP → COOR	+	+	<i>supported</i>
H5b	LP → COOP	-	-	<i>supported</i>
H6a	RFP → COOR	-	+	not supported
H6b	RFP → COOP	+	+	<i>supported</i>

<sup>1</sup> Abbreviations: COOR – Coordination; COOP – Cooperation; CP – Coercive power; RWP – Reward power; EP – Expert power; IP – Informational power; LP – Legitimate power; RFP – Referent power.

<sup>2</sup> Hypotheses which turned insignificant according to the results of t-statistics and, therefore, should not be considered as reliable, are marked *italic*.

Therefore, we can conclude that six out of twelve hypotheses were rejected because of their low statistical significance. The remaining hypotheses which showed a significant value were checked for their sign. Three hypotheses showed a significant value and were supported (H1b, H3b, H4b) and three showed a significant value and were not supported (H1a, H3a, H6a).

## 4. Discussion, implications and conclusions

### Coercive power

In spite of our assumption that coercive power can be seen to bring order and discipline into the relationship as well as be effective in changing behaviour, the effects of coercive power turned out to be negative on both coordination and cooperation. The strength of the effects was approximately equal with a little stronger effect on coordination. The possible explanation for the negative effect of coercive power on coordination may be based on the fact that the targets of influence were not sufficiently motivated to act according to the recommendations of the influencing party and, thus, lost interest in the relationship. Since punished weaker business partners must bear the costs of punishment, the use of coercive power can lead to impairment of judgment. In that case supply chain actors may become too frustrated and angry to care about responsibility for individual or moral choices. Besides, frequent use of coercive power could create tension and frustration, because business operations are disrupted and the decision autonomy of the weaker supply chain actors is constrained, which may result in disagreements and conflict. The main reason for the negative effects of this type of power could be that the monetary payoff of the expected gains from a relationship is too low in comparison to the monetary losses of the recipients, which results in the destructive effects and aversion from the side of the targets of influence. Our general impression was that the respondents were reluctant to speak about the use of coercive power. Therefore, coercive power could have been used in reality more often than the respondents were ready to admit. Consequently, we do not advise managers to apply this type of power, since it promises only negative effects.

### Reward power

According to our assumptions, reward power should have a negative effect on cooperation and a positive effect on coordination. We motivated this statement by the fact that reward power is based on the principles of extrinsic motivation and does not contribute to the long-term intrinsic motivation for the alignment of interests of supply chain participants. In our sample this seems to be the case.

Though the effect on coordination is weak, it is positive. Therefore, an increase in the use of reward power will lead to improvement of coordination in the supply chain. The effect of reward power on cooperation turned out to be negative, as we expected. Therefore, the hypothesized effects of reward power on coordination as well as on cooperation were correct according to the findings. Generally we observed that the use of this type of power provokes changes in behaviour and motivates the target of influence to act according to the will of the influencing party. Our assumptions that reward power results in net benefits for both parties were true. Apparently, this could be because utility derived from the achieved compliance is greater than the cost for providing the reward. When a focal actor uses reward power, it provides extrinsic motivation for the target's commitment. The target is, therefore, driven to comply with the focal actor's requirements, in order to achieve favourable outcomes. This type of power can be considered to be a powerful motivational device for improving the alignment of interests and, thus, cooperation in the supply chain network. Therefore, it is highly recommended to apply reward power for improving both coordination and cooperation.

### Expert power

Expert power turned out to have positive effects on coordination and cooperation. We assumed that the effect of expert power on coordination would be negative, since it is relatively weak with respect to the extrinsic motivation and coordination of activities. However, despite our assumption that expert power is more suitable for the achievement of cooperation and alignment of interests, it showed also a positive effect on coordination. The use of expert power turned out to have a positive effect on coordination as well as on cooperation despite being considered less flexible and unrelated to specific performance from the theoretical point of view. Moreover, these effects were relatively strong. Therefore, we recommend using this type of power as much as possible. For example, supporting ongoing supplier development through technical assistance (e.g. offering various technical support measures, such as training of employees at company headquarters) could stimulate both cooperation and coordination in the supply chain. When managers have specialized knowledge, they have the potential to exert expert power. Taking into account the discussed issues, the use of expert power is highly advisable, since it has a positive effect on both coordination and cooperation.

### Informational power

The effects of informational power are similar to the effects of expert power, though the effect of informational power on cooperation is much weaker than that of expert power. In contrast to our assumptions, informational power showed a positive effect on both coordination and cooperation. We expected that the effect of informational power on coordination would be negative since we assumed that it is unfocused with respect to coordination of activities and lacks specificity about what needs to be done. The specific action that the target needs to perform remains undefined. However, it turned out that informational power had a positive effect on coordination. Sending information apparently influences the target, though presumably indirectly, since it may circumscribe the range of behaviours the other firm considers and, thus, affects its behaviour. Thus, a focal actor may be able to influence the behaviour of other firms to the extent that it can coordinate the processes through the information concerning consumer purchasing behaviour, which the retailer derives directly from its experience of consumer shopping. Being a kind of communication, informational power could have a positive effect on cooperation, since ability to communicate (even without commitment) is typically found to foster cooperation. Another aspect worth mentioning when explaining the positive effect of informational power on cooperation is the fact that possession of new and up-to-date information provides confidence to the focal company in debating and, thus, increases its persuasive capabilities, which, in turn, may increase cooperation. Therefore, it is highly advisable to use informational power in supply chain relationships due to its positive effects on both coordination and cooperation.

### Legitimate power

According to the findings, the effects of legitimate power turned out to be positive for coordination and negative for cooperation. Admittedly, however, despite the positive sign of the effect on coordination, the strength of this effect turned out to be exceptionally weak. Because of its formal nature and clear legal basis, we viewed legitimate power as one of the mechanisms which can be applied to the governance and coordination of suppliers. Legitimate power generally could be expected to reduce uncertainty about behaviours and outcomes by providing formal rules and procedures to govern the relationship. The target of influence has to take into account the legal and economic consequences of violating explicit written contracts. Since the legitimate power originates from a given position or existing norms or laws, the supplier may see the protection

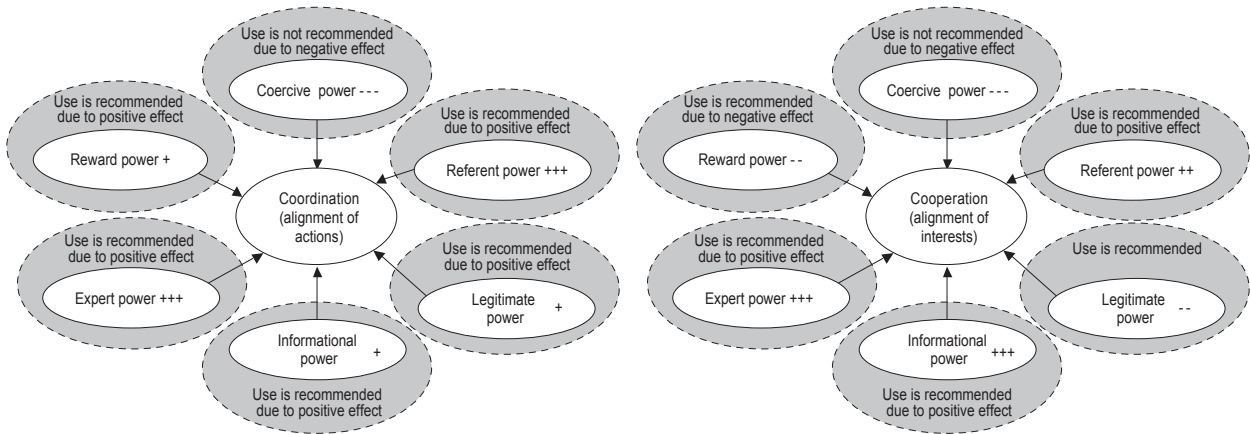
offered by a legitimized position of the retailer as an additional advantage. This could imply the positive result of this type of power. However, in some cases the target of influence may view legitimate power as vague with respect to the necessity of compliance and may resist it. When suppliers perceive the cost of compliance as excessive, they may decide to dissolve the relationship even though the focal actor wins its legal point. Besides, references to legal contracts or informal agreements may appear insulting to the target and imply unfavourable relations in the future. Hence, the use of legitimate power could also increase conflict and result in legal costs for both parties. Therefore, we would not recommend using this type of power for these purposes.

### Referent power

Referent power turned out to have a positive effect on both coordination and cooperation. We assumed that due to the insufficient extrinsic motivation for actions of supply chain members, this type of power may only be used for indirect stimulation of members. According to our assumptions, referent power could be seen as a mechanism of infusing targets with moral purpose and commitment rather than of affecting the task environment, since they do not offer material incentives nor the threat of punishment. Referent power is designed in such a way as to match the target's intangible, subconscious need for status, security and attention with the goal of achieving compliance on a specific issue. Since referent power stems from image and reputation, it is evident that the strength of the motivation to comply with this type of power would be based on the strength of the image and attractiveness of the relationship. In general, referent power could be viewed as having a fundamental impact on the followers' perceptions and beliefs as it does not contain explicit descriptions of tasks. For these reasons we assumed that behaviour might not be affected. However, our assumptions were wrong, since referent power showed a positive effect on coordination despite the lack of specificity of the desired behaviour of the target. Surprisingly, it has an even more positive effect on coordination than on cooperation. Taking into account the discussed issues, the use of referent power is highly advisable.

### Effects on coordination and cooperation

Depending on the origin of power it may have different effects on cooperation and coordination. We worked out a special ranking system for the use of power based on the expected effect on coordination and cooperation (Figure 3).



Ranking Recommended for coordination

- 1 Expert +++
- 2 Referent +++
- 3 Reward +
- 4 Informational +
- 5 Legitimate +
- 6 Coercive --

Ranking Recommended for cooperation

- 1 Expert +++
- 2 Informational +++
- 3 Referent ++
- 4 Reward --
- 5 Legitimate --
- 6 Coercive ---

<sup>1</sup> Abbreviations: '+++' strong positive effect (path coefficient >0.2); '++' moderate positive effect (0.2 > path coefficient >0.1); '+' weak positive effect (path coefficient <0.1); '--' moderate negative effect (-0.2 > path coefficient >-0.1); '---' strong negative effect (path coefficient >-0.2).

**Figure 3. Ranking of power according to recommended use for coordination and cooperation<sup>1</sup>.**

Expert power has the highest ranking among the other types of power for improving coordination. Therefore, we recommend using this strategy as a first priority for improving coordination. However, expert knowledge is not always available in a company. In this case one must consider the second-best alternative to improve coordination in a supply chain. As the results of the study show, referent and reward power also have strong positive effects on coordination depending on the sample. Therefore, when expert knowledge is not available or too costly, we recommend using referent power for suppliers and reward power for buyers. Reward power should be used as a third priority in improving coordination of suppliers' activities. Though legitimate power has a slightly positive effect on coordination of suppliers' activities, one should be careful in opting for this type of power. We suspect that the effect of legitimate power in relationships with suppliers could be neutral or even negative. Coercive power is not recommended for improving coordination, since it has a negative effect in relationships with suppliers.

The preferred strategies for improving cooperation are slightly different from those for coordination. Our findings indicate that expert power is again the best choice, with respect to the strength and sign of the effects. It seems that suppliers appreciate the expert knowledge and consultations provided by their superior partners. This in turn stimulates not only their activities, but also their long-term willingness to cooperate and helps to improve the overall cooperation in the supply chain network. Therefore, if a focal company possesses this kind of expert knowledge it should consider using expert power as a first priority for improving cooperation. The second priority in improving cooperation of suppliers should be the use of informational strategies. Apparently suppliers have a large need for expert knowledge and information in general. We assume that this can be explained by the fact that buyers might be more knowledgeable and possess more up-to-date information, which has an impact on suppliers' willingness to enter a cooperation relationship with buyers. If not able to use expert and alternatively informational power, the focal company should apply referent power in relationships with suppliers.



## 5. Limitations of research and conclusions

As with any study, the findings of this research should be seen within the context of some limitations which could stimulate further research. We faced certain challenges while assessing the model with many variables. It was challenging to assess a relatively complex model with a relatively small sample size of 89 food processors. Moreover, empirical studies usually have some minor measurement problems, and our study is no exception. Though our operationalizations of variables correspond from our point of view with the necessary degree of preciseness, since their development was mainly based on the 'pen-and-pencil' method, additional work would help to improve their quality.

The data in our PLS analysis represent only a single perspective in the dyad: food processing companies. In this context, we are aware that gathering data from other companies' perspectives, such as retailers or agricultural producers, could have produced different (presumably more realistic or complete) findings. We also cannot assess whether or how the perceptions of other groups of members in supply chain networks differ from each other.

The problem with conducting this survey with only one group of respondents and using the data to estimate causal effects is that the respondents might have understood the assumed effect we were researching and given us biased answers depending on their own conclusions. Even though we assume that the link between the perception of respondents and reality is strong, the respondents in our survey are humans, who tend to make false statements for various reasons. As a result, the possibility of a common method bias should be kept in mind.

Another limitation of the study is that our research was conducted in a particular setting: the Russian agri-food business. This fact raises the common question of generalizability of the obtained results. One should keep in mind that attitudes, culture and the way of conducting business are different in every country. Our findings are based only on a single study conducted in a single country. A reproduction of this project with a different group of respondents or with the same group of respondents at a different point in time, would presumably produce different research results.

Our study offers recommendations for managers about the use of different types of power in managing the Russian agri-food supply chains, with a specific focus on coordination and cooperation issues. In order to manage supply chain

networks successfully knowledge of different types of power is essential. The developed ranking of different types of power according to their effects on coordination and cooperation is designed to help managers make the right decisions in choosing the appropriate type of power for coordination purposes. We do not specifically suggest which combination of power types is appropriate, but we advise supply chain managers to be very cautious in choosing the appropriate type and to adjust their choice to the problem setting and strategic goals. Managers should know that there is not only coercive power, but also less aggressive power types which can be effectively used for improving coordination and cooperation in supply chains. The potentially destructive nature of coercive and legitimate power types should not be ignored when discussing their role and implications for successful cooperation in supply chain networks. Knowledge about these effects should be skillfully used for effective management of supply chain networks.

Overall, the results of our study have high theoretical and practical relevance based on the developed ranking of different types of power according to their expected effects. The use of power is an important managerial issue. The time has come for a new and fresh approach to solving managerial problems in the supply chain context. We hope that our research results and ideas will be interesting for both academics and practitioners and will encourage them to rethink their current practices and ideas and to use power as an effective tool in a problem-solving and constructive way to enhance the performance of supply chain networks as a whole as well as of their individual members.

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