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VALUE CREATION METHODS IN A NETWORK APPROACH. A CASE STUDY OF GLOBAL ENGINEERING SERVICE PROVIDERS

METODY KREOWANIA WARTOŚCI W PODEJŚCIU SIECIOWYM DO STRATEGII. STUDIUM PRZYPADKU GLOBALNEGO DOSTAWCY USŁUG INŻYNIERSKICH

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Abstract: The purpose of this study is to indicate the methods of identifying sources of value in a sample of four organizations which are global engineering service providers operating in the form of an interorganizational network. The empirical research used the network paradigm and the concept of organization description using network rents. The research was be based on an especially developed questionnaire survey using a structured survey questionnaire proposed by Trzaska. The study used a critical analysis of the relevant literature, desk research, and the author's own analytical tools for measuring the value generated in interorganizational networks. The outcome of the study is the identification of the value creation methods applied by global engineering service providers and the indication of the possibility to measure them. The originality this research results from the new value creation methods applied by global engineering service providers.

Keywords: strategic management, virtualization, organizational network.

Streszczenie: Celem badania jest wskazanie metod identyfikacji źródeł wartości w organizacjach typu „globalny dostawca usług inżynierskich" działających w formie sieci międzyorganizacyjnej. W badaniach wykorzystano paradygmat sieciowy zarządzania strategicznego i koncepcję analizy organizacji stosującej renty sieciowe. Do badania wykorzystano specjalnie opracowany ustrukturyzowany kwestionariusz ankietowy zaproponowany przez R. Trzaskę. Ponadto użyto metody krytycznej analizy literatury przedmiotu, metody badania typu *desk research* oraz autorskiego narzędzia analitycznego do pomiaru wartości generowanej w sieciach międzyorganizacyjnych. Efektem badania jest identyfikacja metod kreowania wartości stosowanych przez globalnych dostawców usług inżynierskich i wskazanie możliwości ich pomiaru. Oryginalność badań wynika ze wskazania nowych metod kreowania wartości stosowanych przez globalnych dostawców usług inżynierskich.

Słowa kluczowe: zarządzanie strategiczne, wirtualizacja, sieć organizacyjna.

1. Introduction

Seeking methods of value creation, defined as economic surplus, is a specific point where the interests of both management researchers and practitioners meet. Academic studies and examples of contemporary enterprises indicate various areas of seeking value creation methods, from economization, to financial management (cost optimization, profit maximization), to shareholder or stakeholder satisfaction building, to networking activities. Trends, in the areas of both theory and practice, have evolved over years. The value creation method that is undoubtedly the most intensively examined, and at the same time the most frequently observed one in business reality in the 2020s is linked to networks and their broadly defined implications.

By combining their interest in the phenomenon of networks and value creation in the form of economic surplus, the authors of this paper attempted to indicate the methods of identifying sources of value in organizations which are global engineering service providers operating in the form of an interorganizational network. The research question answered by this paper is how an organization generates values by using the network it co-forms, and how these values can be measured. The research was conducted in the form of a case study of selected organizations demonstrating the characteristics of networks, and satisfying the conditions of global engineering service providers.

2. Networks in research in management sciences

Networks in management sciences have already been intensively explored by researchers worldwide since the beginning of the 21st century. Particularly intensive research has been conducted in the area of strategic management. The object of interest among researchers of networks in strategic management is learning about the mechanisms of building a permanent competitive advantage of an enterprise and

gaining a practical implementable knowledge of how to generate economic surplus in a network (Borgatti & Halgin, 2011; Czakon, 2012; Gulati, Lavie, & Madhavin, 2011; Niemczyk, 2013; Stańczyk-Hugiet, 2011). As stated by the latter "management sciences are economic sciences and therefore it becomes necessary to explain strategic problems also from the perspective of economic rent" (Stańczyk-Hugiet, 2011).

The analysis of the development of strategic management sciences from the angle of economic rents indicates the dominance of three basic ways of thinking: the planning stream, which refers to the Ricardian rent; the positioning stream (Industry Analysis), which builds a competitive advantage by increasing the share in a sector; and the resource stream, which also points to the Ricardian rent but in the context of value creation (Resource-Based View) (Niemczyk, 2013; Niemczyk & Lachota, 2014). In this evolution, the dominant research stream has now become network research (in the 2020s).

Networking is an undeniable characteristic of today's organizations and management systems. As emphasized above, a particularly large number of studies concern network performance. This problem is usually solved by referring to network rents. Without their identification, the prerequisite for building a network and keeping it capable of effective operation and competition would be a waste of resources. Hence, it must be assumed that each network structure brings benefits, primarily economic ones, to its participants. The source of the benefits is rents in the following respects: transaction costs (Williamson, 1981), value appropriation (Blyler & Coff, 2003; Mazur, 2011), knowledge diffusion, value networks (Stabell & Fjeldstad, 1998), and network effect (Katz & Shapiro, 1985), as well as the findings of research in the following areas: social network theories (Borgatti & Halgin 2011; Jones, Hesterly & Borgatti, 1997), network theory of power (Castells, 2011), and the theory of structural holes (Burt, 2009).

3. Network rents in strategic management

The notion of economic rent was originally used mainly with reference to land rent, where it meant a specific part of the product of land paid to its owner. Today, the notion of rent refers to tangible and intangible resources, but also rare competences, this means an achievable excess over alternative costs. In other words, it is the difference between the current and the alternative use of a resource, which justifies the present operation (Mahoney, 1995).

This study focused on network rents and also attempted to identify measurement methods applied in analyses of individual types of network rents.

The rent resulting from the possibility to reduce **transaction costs** through a network is the basic network rent (Jones et al., 1997). It is a consequence of the analysis of a network as a combination of contracts rather than a hierarchical structure. Its theoretical basis comes from the works by Coase and Williamson, Nobel Prize winners. Networks use the institution of contract, being a long-term

contract, instead of a hierarchy and a one-off contract, as the fundamental component building the network structure. As a result, it is possible to achieve lower hierarchy costs (no hierarchical structure) and lower transaction costs (due to the fact that the contract is long-term rather than a one-off). In practice, the transaction cost theory has contributed to the development of outsourcing in enterprises. The easiest way to measure transaction costs is to collate the ex-ante transaction costs of a contract with a network contractor which exist or are anticipated when drawing up the contract, and the ex-post transaction costs of such a contract which occur when carrying out the terms and conditions of the contract, with the costs of the one-off contracts which balance the network contract. Obviously, this method can be used only to calculate the costs unequivocally assigned to the contract. The whole calculation should also allow for the reduction of the costs arising from the mitigation of risk, and the changes of the usefulness of the entire contract from the perspective of the entire organization.

The benefits arising from the enhanced level of interorganizational trust can be also associated with rent in respect of transaction costs. The positive correlation between trust and performance has been repeatedly examined and confirmed by research. There are numerous studies concerning the positive influence of trust between partners on the performance achieved in networks (Ryciuk, 2017). The influence of trust on the amount of transaction costs can be defined as indirect (for example as a stimulus for making the resources determining the created value in the network available), or direct (a higher level of partner integration, which makes it possible to build a competitive advantage). The influence of the phenomena occurring in and between organizations on the level of trust and the common impact on the efficiency of organizations was also examined (Antoldi & Cerrato, 2020). Capaldo and Giannoccaro (2015) argued that trust is largely dependent on the links between partners, i.e. on the dependency relationship and the necessity to enter into a relationship. When analysing the supply chain structure, they stated "that the specific interdependence pattern that characterizes the supply chain has a significant moderating effect on the relationship between trust and supply chain performance, while the moderating effect exerted by the degree of interdependence is not statistically significant" (Capaldo & Giannoccaro, 2015). It is worth mentioning that, according to some researchers, the phenomenon of trust is the prerequisite for building a network (Antoldi & Cerrato, 2020), and it is only its parameters that determine the sustainability of the network and influence the generated performance. There is also an opinion that networks are a way to replace trust, which was lost in management at the end of the 20th century, with contractual dependencies which are a better obligation to comply with contracts.

The category of relational rent is also related to the context of transaction costs. Relational rent is considered the key component of a network (along with the entities it ties). It consists in achieving a surplus through the "relational potential of the organization" (Chrisidu-Budnik, 2011; Stańczyk-Hugiet, 2012; Zakrzewska-

-Bielawska, 2016). Therefore, seeking a relational rent will be an aspiration for such a configuration of relations between partners as it enables a fuller use of resources and a more efficient response to changes in the environment, i.e. seizure of the occurring chances and avoidance of risks. Casciaro and Piskorski (2005) revised the classical resource dependency model by pointing to the dependency between relations and interorganizational behaviour, i.e. "constraint-absorption operations, such as mergers and acquisitions or joint ventures, are fruits of dependence and its converse, power".

Rent in respect of appropriation is a rent ranked lowest on the scale of development levels of a network organization according to the theory of five network rents (Niemczyk, 2015), which consists in taking over the values created by other network participants (Blyler & Coff, 2003; Woźniak-Sobczak, 2015). A value can be captured from various internal and external stakeholders. These can be the enterprise's contractors (suppliers, consumers, intermediaries), stakeholders from capital and financial markets, competitors, and enterprises from the coopetition area.

The knowledge diffusion occurring on the web is a multifaceted phenomenon present in formal and informal relations between all stakeholders of an organization. In the early 21st century, this usually concerns technological, organizational, and management know-how, and indirectly affects all assets of the organization and network, leading to cost reduction and/or revenue increase. This type of rent can be subject to serious limitations arising from defense mechanisms (protection of valuable knowledge resources). **Rent in respect of knowledge diffusion** is the most commonly identified benefit[1] related to participation in a network (Cowan & Jonard, 2004; Reagans & McEvily, 2003).

A **value network** can generate benefits resulting from the mutual penetration of horizontal and vertical systems, where a given link may assume positions in various systems at the same time, also as a component assuming various functions. Systems from a value chain, to a network of more than one chain, to a system covering all contract stakeholders, can serve as an illustration of solutions that

[1] "Models knowledge diffusion as a barter process in which agents exchange different types of knowledge. This is intended to capture the observed practice of informal knowledge trading. Agents are located on a network and are directly connected with a small number of other agents. Agents repeatedly meet those with whom direct connections exist and trade if mutually profitable trades exist. In this way knowledge diffuses throughout the economy. We examine the relationship between network architecture and diffusion performance. We consider the space of structures that fall between, at one extreme, a network in which every agent is connected to n nearest neighbours, and at the other extreme a network with each agent being connected to, on average, n randomly chosen agents. We find that the performance of the system exhibits clear 'small world' properties, in that the steady-state level of average knowledge is maximal when the structure is a small world (that is, when most connections are local, but roughly 10 percent of them are long distance). The variance of knowledge levels among agents is maximal in the small world region, whereas the coefficient of variation is minimal. We explain these results as reflecting the dynamics of knowledge transmission as affected by the architecture of connections among agents" (Cowan & Jonard, 2004).

are diversified in terms of structure – see Table 1 below. As suggested by Stabell and Fjeldstad (1998) "choice of (emphasis of) value configuration is an additional dimension or a third option beyond Porter's two-dimension strategies of cost advantage and differentiation". Prahaladi and Ramaswamy (2004) emphasized the significance of the "consumer–company interaction" defined as an active "one-on-one or one-to-many" relation (an obvious characteristic of networking) by stating that it has become "the locus of value creation." The value network quality determines the value proposition and, consequently, the amount of rent in this respect for the organization.

Table 1. Comparison of the basic value creation logics

Value chain	Value shop	Value network
transformation of inputs into products for the customer	solving customer problems	linking customers, exchange of value
inbound logistics operations, outbound logistics marketing service	customer problem-finding and acquisition, generating solutions to the problem, choice of a solution, execution of the project, control	network promotion and contract management, service provisioning, network infrastructure operations
infrastructure building, human resource management, developing technologies and supply	infrastructure building, human resource management, developing technologies and supply	network infrastructure development, service development

Source: (Mazur, 2011, pp. 1-200; Stabell & Fjeldstad, 1998, pp. 413-437).

Network effect is defined as the phenomenon that the benefit of using a good/service increases with the number of users adopting the same or compatible good/service (Katz & Shapiro, 1985). Lin and Bhattacherjee (2008) quoted Katz and Shapiro, and Gallaugher and Wang, stating that "network effects arise when the utility that consumers derive from the consumption of a product or service depends on the number of other users of the same product or service or the availability of complementary products or services that generate additional value for users of the original product or service" (Gallaugher & Wang, 1999; Katz & Shapiro, 1985;). Factors that drive network effects such as network size and availability of complementary goods or services, are called network externalities (Economides, 1996), and products or services exhibiting such effects are called network goods (Lin & Bhattacherjee, 2008).

Unfortunately, the relevant literature lacks comprehensive network rent measurement tools. Table 2 presents a few exemplary results of rent measurement tool examinations. Nevertheless, the most frequent references can be made to analyses based on interview or survey questionnaires. Such an approach was selected also in the research, the findings of which are presented in this paper.

Table 2. Network rents and propositions of their measurement

Type of rent	Research method	Object of research
Rent in respect of transaction costs	Questionnaire survey	
	Analysis of ex-ante and ex-post transaction costs of the concluded long-term contracts in relation to hierarchy costs and one-off contract costs	Efficiency of organizational trust (Łobos & Mazur, 2016)
Network rent	Desk Research	Discussion over network effect theory (Weitzel, Wendt, &Westarp, 2000)
	Interviews (sociological perspective) and statistical analysis Questionnaire survey	Network effect and economic performance (Uzzi, 1996)
	Growth rate of the number of new customers served or new ecosystems	Number of customers, number of ecosystems
Rent in respect of knowledge diffusion	Structural Equation Modelling	Market knowledge diffusion and business performance (Hughes, Morgan, & Kouropalatis, 2008)
	Case study Questionnaire survey	Knowledge diffusion and technological capabilities growth (Mu & Lee, 2005) and profitability (Hanel & St-Pierre, 2002)
	Dynamics of implementing new solutions	
Rent in respect of value network	Literature studies Desk Research Questionnaire survey	Relations between business model and value creation (Rudny, 2013)
	Customized Value Creation Model	Relations between the product key feature (openness of IT service platforms) and the product attractiveness (Simpson, Siguaw, & Baker, 2001)
	Conceptual Modelling with Empirical Examples	Value creation in triadic business models (Andreassen et al., 2018)

Source: own elaboration.

4. Research method

The research method was based on the case study of four selected organizations that satisfy the conditions of global engineering service providers. The whole research procedure is outlined in Figure 1.

Stage 1 covers a critical literature review in order to identify network rents and methods of their examination, and the findings are presented in Section 2. There were five network rents identified at this Stage. The need to use primarily a survey questionnaire in the research was also noted.

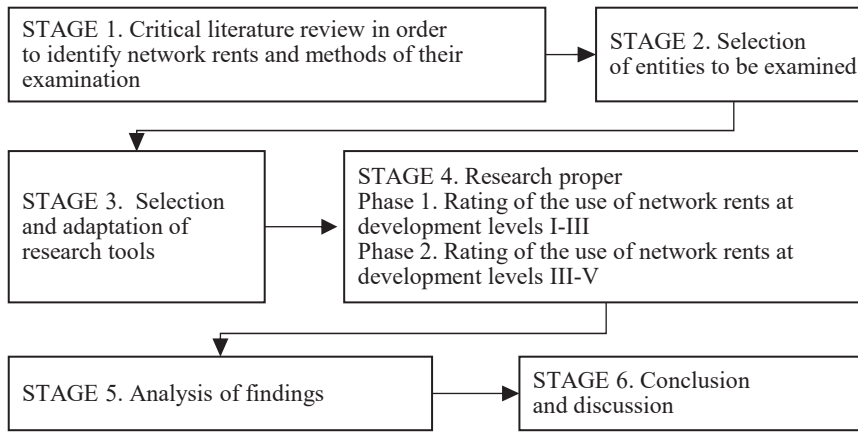

Fig. 1. The research procedure used in the author's own research

Source: own elaboration.

In Stage 2, it was decided to select the entities to be subject to the examination, selecting four enterprises from the sector of global engineering service providers. This sector, by definition, requires that enterprises operate in various types of networks and have highly specialized, and hence rare, resources at their disposal. This sector is one of the highly processed services making strong use of ICT resources. Moreover, the majority of operation take place with the use of interorganizational networks and, primarily, contract-based networks. These characteristics permit one to perceive the potential performance as possible recommendations for other organizations, and direct the attention of researchers of networks to the dimension of an economic activity that is characteristic of the contemporary economy (servitization, Industry 4.0). This allows for the actual verification of whether network rents are achievable for enterprises operating in this type of networks. The characteristics of the analysed entities included: type of economic activity, scope of services, size of organization defined as the number of branches/subsidiaries and the number of employees, geographical coverage, and the most commonly held position in a network built around a contract. Such characteristics partly enable to identify those which could be perceived as network characteristics. A detailed compilation of the characteristics present in the examined entities is included in Table 3.

The analysis of the description of the examined enterprises shows substantial similarities between the entities, and confirms their network characteristics (activities in various sectors, provision of various services, geographical coverage, contract-based network character, most frequent position in a contract-based network).

Stage 3 covers the selection and adaptation of the research tools. The research was based on a questionnaire survey using a structured survey questionnaire proposed Trzaska (2017).

Table 3. Description of selected enterprises (A, B, C, D) by selected characteristics

Key description		A	B	C	D
Sector	construction	x	x	x	x
	civil engineering	x	x	x	x
Subsector	transportation	x	x	x	x
	cities	x	x	x	x
	national governments	x	x	x	x
	public buildings and facilities	x	x	x	x
	commercial buildings and	x			x
	facilities	x	x	x	x
	environment	x	x	x	x
	water management	x	x	x	x
	energy	x			x
	oil and gas industries	x			x
Services	architecture and design	x	x	x	x
	engineering	x	x	x	x
	planning and consulting	x	x	x	x
	feasibility study	x	x	x	x
	preliminary design	x	x	x	x
	construction management	x	x	x	x
	project management	x	x	x	x
	site supervision	x	x	x	x
	testing and commissioning	x	x	x	x
Geographical coverage	continents	6	5	6	6
	countries	70	N/A	80	70
Branches and/or subsidiaries	<20	x			
	>20		x	x	x
Employees	<2,000	x	x		
	>2,000			x	x
Most frequent position in contract-based network	sole contractor	x		x	x
	joint venture leader	x	x	x	x
	joint venture partner	x	x	x	x
	key subcontractor		x		

Source: own work based on the conducted research.

The questionnaire developed on the basis of a tool devised by Trzaska (2016, 2017) in his doctoral dissertation, who in the process of building the strategic analysis model in the network approach examined the networking of organizations with the assumption that there are correlations between characteristics and network rents. Relying on the assumption of the five network rents described in Section 2, i.e. appropriation, transaction costs, value networks, knowledge diffusion, and network effect, and the propositions of network development levels (Niemczyk, 2015), Trzaska prepared a questionnaire for rating the networking of organizations, which was adapted to create two questionnaires analysing the extent to which network

rents are used for the purpose of this research. The fundamental idea behind the questionnaire structure is illustrated below (Table 4).

Table 4. Matrix of the network rent and network development levels as a starting point for the questionnaire structure

		Network development level				
		I	II	III	IV	V
Network rent	Appropriation					
	Transaction costs					
	Value network					
	Knowledge diffusion					
	Network effects					

questionnaire 1 questionnaire 2

Source: own work based on (Niemczyk, 2015, pp. 161-170).

Questionnaire 1 contains 12 questions, including 3 questions regarding the phenomena characteristic of development levels I-III from the area of four network rents. Questionnaire 2 contains 12 questions, including 3 questions regarding the phenomena characteristic of development levels III-V from the area of four network rents. The possible answers to the formulated questions were "Yes", "Don't know", and "No". They were assigned 2, 1, and 0 points, respectively. The respondents were also allowed to add comments, if any, to minimize the number of "Don't know" answers.

The research assumption was that the questionnaires would be completed by the senior management staff in the examined organizations. The fundamental principle when selecting the respondents was their close familiarity with the organization, including its strategy and the reality in which it operated. Managers in a parent company (respondents A, B, and C) or in a subsidiary directly controlled by the parent company in a group (respondent D) in key areas such as business development (respondents A and B), business unit management (region, business product) in at least a few countries (respondents C and D), were invited to participate in the survey. The option of obtaining answers to the survey questions from generally available sources was not allowed. The survey questionnaires are presented in Tables 5 and 6 below.

Stage 4 is the research proper, it covers the rating of the use of network rents at development levels I-III and the rating of the use of network rents at development levels III-V. The findings of this research are presented in Section 4. Stages 5 and 6 are the analyses of the findings and conclusions from the conducted research.

Table 5. Survey questionnaire for rating the use of network rents – phase 1

Survey questionnaire for rating the use of network rents – phase 1	Yes [2]	Don't know [1]	No [0]	Comments
APPROPRIATION (rent in respect of value appropriation)				
Does the enterprise lawfully use the market solutions developed by other entities?				
Does the enterprise protect its solutions with the intellectual property law?				
Does the enterprise, in its external operations, use its bargaining position to gain benefits arising, for instance, from cost arbitrage?				
TRANSACTION COSTS (rent in respect of transaction costs)				
Does the enterprise work on cost optimization?				
Are the costs of external contracting lower than the costs of a solution such as internalization?				
Does the enterprise use strategic outsourcing in at least some areas of its activity?				
VALUE NETWORK (rent in respect of creating value in a value network)				
Does the enterprise build values around the customer–company feedback as part of a network of affiliates?				
Does the enterprise conduct research and implement value chain optimization solutions on an ongoing basis?				
Is the enterprise oriented towards using economies of scale in the area of production?				
KNOWLEDGE DIFFUSION (rent in respect of knowledge diffusion)				
Does the enterprise create tacit knowledge?				
Does the enterprise obtain knowledge from the market?				
Is the permeation of knowledge among various entities within the enterprise along hierarchical paths observable?				

Source: own work based on (Trzaska, 2017).

Table 6. Survey questionnaire for rating the use of network rents – phase 2

Survey questionnaire for rating the use of network rents – phase 2	Yes [2]	Don't know [1]	No [0]	Comments
TRANSACTION COSTS (rent in respect of transaction costs)				
Does the enterprise occasionally create interorganizational networks around the contract/customer?				
Does the enterprise systemically create interorganizational networks around the contract/customer?				
Does the enterprise cooperate with competitive entities (coopetition)?				
VALUE NETWORK (rent in respect of creating value in a value network)				
Does the enterprise create an interorganizational network with at least one contract stakeholder?				
Does the enterprise create an interorganizational network with all contract stakeholders?				
Is the enterprise open to using and implementing expert knowledge related to creating the synergy effect between all contract stakeholders?				
KNOWLEDGE DIFFUSION (rent in respect of knowledge diffusion)				
Is the non-hierarchical permeation of knowledge among various entities within the enterprise observable?				
Is the permeation of knowledge among various entities within the specific framework of network diagram observable?				
Is the spontaneous permeation of knowledge among various entities within the network outside the network diagram observable?				
NETWORK EFFECTS (rent in respect of network effect)				
Does the enterprise record performance increase as a result of including a new entity in the organization network?				
Do the services, products supplied to the customer increase their efficiency as a result of expanding cooperation with other entities?				
Would the loss of one of the entities within the network have a significant effect on the operation of the enterprise?				

Source: own work based on (Trzaska, 2017).

5. Research on the use of network rents – findings

The research was conducted in the period October-December 2020. The obtained answers were compiled in summary tables (Table 6 and Table 7) and presented in the form of radar charts. Separate charts were prepared for each organization – Figures 2-5, while the summary chart (Figure 7) shows the mean of all the respondents' answers in both phases.

Table 7. Summary compilation of the use of network rents in the examined enterprises in two phases of the research (by the arithmetic mean of the point value achieved when rating the use of the individual types of rents)

Examined organization / Type of rent	A		B		C		D	
Phases	1	2	1	2	1	2	1	2
Appropriation	2.0		0.7		1.3		1.3	
Transaction costs	1.3	1.3	1.3	2.0	0.7	1.3	1.3	1.3
Value network	0.7	1.3	1.0	2.0	1.3	1.0	1.0	0.7
Knowledge diffusion	1.3	1.3	1.7	2.0	1.3	1.3	1.0	1.7
Network effects		2.0		1.3		1.3		1.0

Source: own elaboration.

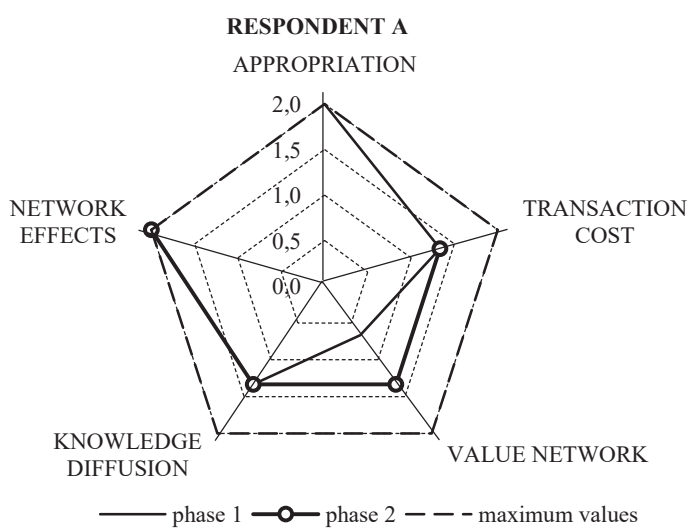

Fig. 2. Radar chart of using network rents in organization A. Assessment by respondent A

Source: own elaboration.

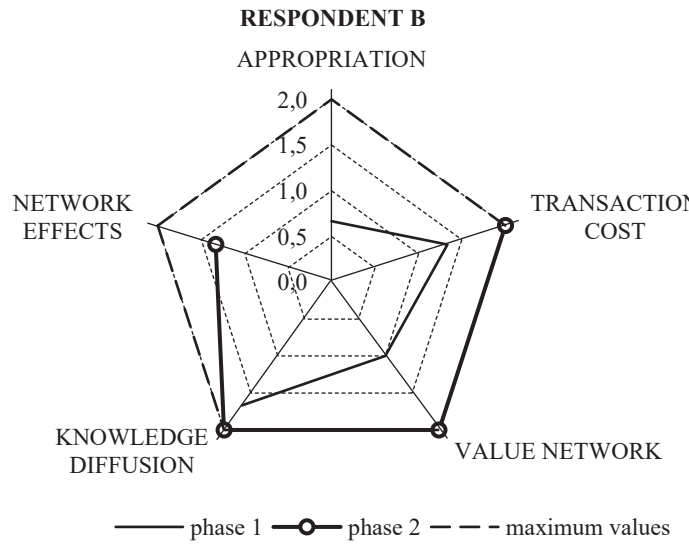

Fig. 3. Radar chart of using network rents in organization B. Assessment by respondent B

Source: own elaboration.

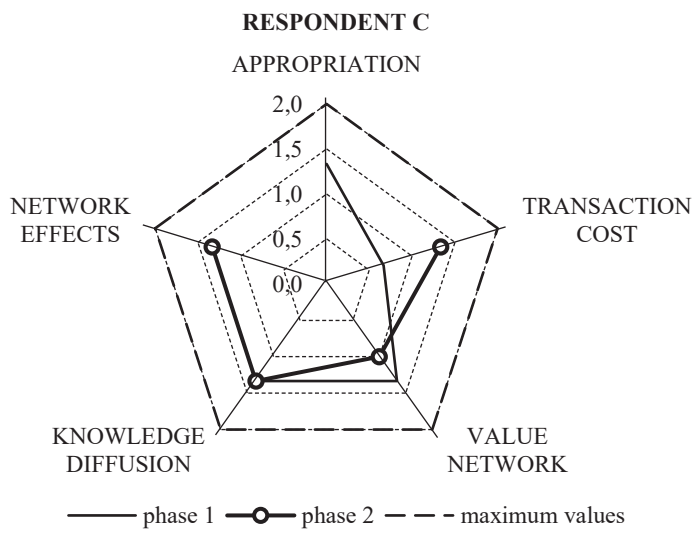

Fig. 4. Radar chart of using network rents in organization C. Assessment by respondent C.

Source: own elaboration.

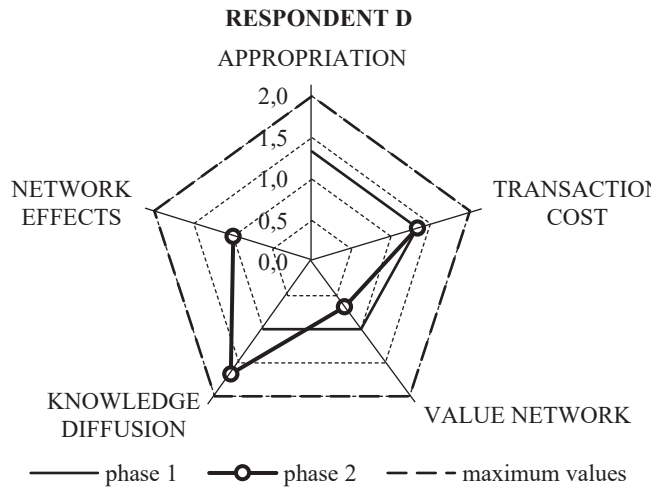

Fig. 5. Radar chart of using network rents in organization D. Assessment by respondent D

Source: own elaboration.

The analysis of the data presented above shows similar results achieved by all the enterprises in the area of three rents: rent in respect of transaction costs (rating within the range 1.0-1.7), rent in respect of value network (rating within the range 0.8-1.5), and rent in respect of knowledge diffusion (rating within the range 1.3-1.8). Quite diverse results were observed in the area of rent in respect of network effects (rating within the range 1.0-2.0). The greatest discrepancies were recorded in the results for rent in respect of appropriation (rating within the range 0.7-2.0). Interestingly, respondent A's answers provided the highest results (2.0) in two opposite rents, i.e. appropriation and network effects. According to the network level concepts, these are the two rents located on the opposite ends of the network development scale and they coexist only at the third level of network development. The lowest mean result in the entire research was recorded in the area of rent in respect of value appropriation (rating of 0.7 – respondent B), which might confirm the view of the weakness of this network rent (passive assumption of value, parasitic relationship).

The structure of the obtained answers is presented in Figure 6.

The performance of the individual enterprises might indicate the places where value is created and the places where the organization's effort concentrates to create value. The most vivid picture is that of enterprise A, which is oriented towards appropriation and network effects to the greatest extent, and enterprise B, which is not interested in rent in respect of appropriation and compensates it with other network rents, mainly the one in respect of knowledge diffusion.

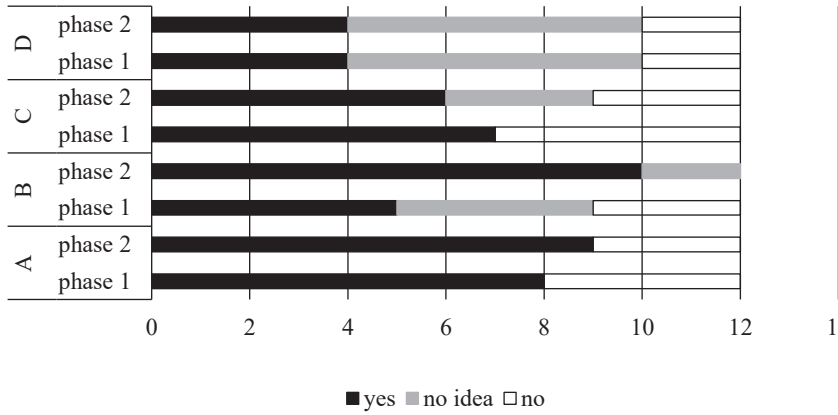

Fig. 6. Distribution of answers regarding the use of network rents in the examined organizations by respondents A, B, C, and D

Source: own elaboration.

Table 8. Summary compilation of the use of network rents in the examined enterprises in two phases of the research (by the arithmetic means of the ratings from two phases of the research on the use of network rents in the examined organizations and for all organizations)

Examined organization / Type of rent	A	B	C	D	All organizations
Appropriation	2.0	0.7	1.3	1.3	1.33
Transaction costs	1.3	1.7	1.0	1.3	1.33
Value network	1.0	1.5	1.2	0.8	1.13
Knowledge diffusion	1.3	1.8	1.3	1.3	**1.46**
Network effects	2.0	1.3	1.3	1.0	**1.42**

Source: own elaboration.

This research is not free from limitations related to the applied method. Emphasis must be put mainly on the subjectivism of the achieved ratings. Moreover, the questionnaire questions are closed, which might result in the tendency to answer "Don't know (no idea)" when in doubt. In order to discourage the respondents from such behaviour, it was decided to allow comments. Despite this, there were 22% of such answers, which may speak against the tool (clarity of the formulated questions) or the respondents (lack of knowledge).

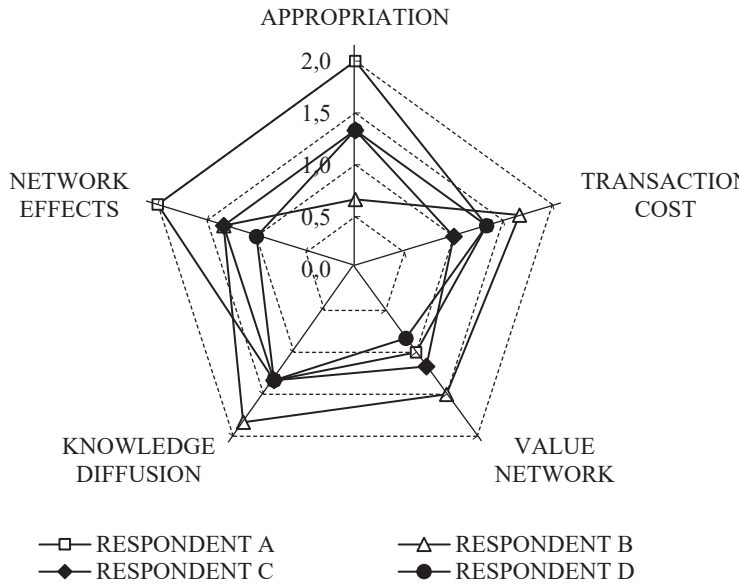

Fig. 7. Radar chart of using network rents in the examined organizations

Source: own elaboration.

6. Conclusion and discussion

The conducted research based on a sample of four organizations indicates the high potential of the proposed tool for rating the use of network rents in the organizations satisfying the conditions of a network (operations in various sectors, provision of various services, geographical coverage, contract-based network character, most frequent position in the contract-based network). The obtained performance confirms that such organizations, in the opinion of the surveyed respondents, achieve surpluses characteristic of network rents. The highest rating was achieved by the effect resulting from the network knowledge diffusion, followed by the network effect. The obtained ratings are not in conflict with the characteristics of the examined organizations, i.e. global engineering service providers. These are organizations providing specialist services based on the flow of knowledge between such organizations, and the research has confirmed the characteristics of the analysed examples. Lower ratings were achieved by rents in respect of transaction costs and appropriation, while the lowest rating was achieved by rent in respect of value network. This is a type of surplus that requires a different organization of work, which is still rarely observed in reality in network organizations, in particular ones providing global engineering services.

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