European Research Studies Journal
Volume XXIX, Issue 1, 2026

pp. 316-336

Conditions and Benefits of Using Artificial Intelligence in Inter-Organizational Networks

Submitted 13/11/25, 1st revision 05/12/25, 2nd revision 20/12/25, accepted 25/01/26

Marcin Flieger[1]

Abstract:

Purpose: *The main scientific purpose of this article is to identify conditions and benefits of exploiting artificial intelligence tools by organizations collaborating within network. The study focuses on diagnosing how AI technology may contribute to the increase in efficiency of operating from the perspective of both individual member of network and network as a whole.*
Design/Methodology/Approach: *Conceptual development and positioning of the research aim at providing a generalizable contribution to management science, at the same time being accessible to practitioners. The research was carried out using the interpretative method of a case study, following its methodological rigor. Carried out a case research provided data corresponding with set research questions. Additionally, the results were confronted and confirmed within internal documents analysis.*
Findings: *The character of network collaboration generally is not favourable in terms of integrating artificial intelligence tools. It makes it difficult to work out mechanisms of systematic collecting, sharing and analysing information and data, which constitute a fundamental condition of efficient implementation of AI tools. Moreover, it appeared that AI technology contribution in supporting gaining benefits from network collaboration (in case of both analysed perspectives) is limited.*
Practical Implications: *The results allow identifying practical conditions and a scale of taking advantage of AI tools within networks, including two perspectives. These considerations serve as a guideline for managers who perceive AI technology as a vital factor that can support increase in efficiency of inter-organizational network collaboration.*
Originality/Value: *The author adopts a new perspective to the problem of efficient exploitation of AI technology in managing organizations, focusing on the specific conditions of operating within inter-organizational networks. The study expands our understanding of how the main features of networks correspond with the nature of artificial intelligence tools. It presents a concise theoretical construct which explains how network participants can use AI technology in order to support gaining unique rents dedicated to network collaboration.*

Keywords: *Networks, artificial intelligence, network collaboration benefits, AI tools.*

JEL classification: *D22, D85, L14, O32.*

Paper Type: *Research article.*

[1]*Assoc. Prof., General Tadeusz Kościuszko Military University of Land Forces, Poland, ORCID: 0000-0002-6810-7141; e-mail: marcin.flieger@awl.edu.pl;*

1. Introduction

Nowadays inter-organizational collaboration within network becomes a great value, as it corresponds well with global economic conditions of doing business. Organizations operate in the environment characterised by multi-directional co-dependence of business partners (Peterman *et al.*, 2020; Tatarynowicz *et al.*, 2016).

Such relations constitute inter-organizational network of interactions (Kim and Howard, 2016; Mayne *et al.*, 2003). The theory of network abandoned an atomic perspective of explaining reality in favour of a more holistic approach towards network collaboration (Bryson *et al.*, 2015; Gebo and Bond, 2019; Sakai and Kang, 2000). Network itself constitutes a collection of long-term, formal and informal, direct or indirect relations between two or more units (Camagni, 1995; Håkansson and Snehota, 1989; Kilduff and Tsai, 2003).

They are based on free will of joining or leaving network, trust, partnership and equality (Edelenbos and Klijn, 2007). As a consequence, network's structure becomes flat and flexible. Network itself may reconfigure fast, in order to adjust to changing conditions and expectations of clients. This feature makes network collaboration especially valuable in terms of securing position of an organization, as we take into consideration that current conditions of managing organizations are rather unfavourable and demanding (He *et al.*, 2020; Pedersen *et al.*, 2022; Barbier and Robertson, 2022). It refers to both microeconomic and macroeconomic conditions, such as rapid growth of inflation and interest rates, limiting access to financing (D'Mello and Toscano, 2020; Xu, 2020).

Also, organizations need to assess competences to adjust to strong global trends and phenomena such as: digitalization processes, robotization or implementation of green new deal. Finally, managers face so-called 'black swans', which are sudden, extremely negative events difficult to predict and, as a result, in most cases impossible to prepare (lately they were e.g. restrictions caused by the conflict in Ukraine, black-outs or failures of banking payment systems).

Taking all these aspects into consideration, a natural question arises how to minimize these negative trends by increasing efficiency of inter-organizational networks, in the context of creating value and bringing various benefits for network participants.

The answer may be implementation of artificial intelligence (AI) tools, which develop dynamically and are said to be a game changer that is going to revolutionize managing organizations.

This leads to a general problem in what way artificial intelligence tools can support achieving benefits from network collaboration. In the paper I focus on answering the following research questions:

1. How do the crucial features of inter-organizational networks correspond with the nature of artificial intelligence tools?
2. What are the conditions of taking advantage of AI tools within network collaboration?
3. In what areas can AI tools contribute to gaining relational rent and network rent by organizations collaborating within network?

The main objective of the paper is to identify conditions and benefits of exploiting AI tools by organizations collaborating within network. Understanding the nature and possibilities of AI instruments may contribute to the increase in efficiency of the process of creating value by each member of network and network as a whole (Sharkey *et al.*, 2021).

Presented considerations are intended to provide both theoretical and practical contribution. More in-depth understanding of the characteristics of network collaboration and network members' expectations allows more conscious exploitation of AI tools, which in turn leads to the increase in efficiency of creating value by network participants.

This article presents a concise theoretical construct which explains different kinds of network collaboration benefits and how artificial intelligence tools can support gaining these rents. This conceptualization may serve as a template for practical use by managers; how to exploit AI in order to maximize expected gain within networks.

2. Literature Review

2.1 Specificity of AI Technology

Artificial intelligence (AI) is a technology designed to allow computers and machines to simulate the way we learn and understand things, how we solve problems and make decisions. It is supposed to support human creativity and autonomy. What is crucial, it is able to learn from new information and experience, suggesting creative, innovative solutions. From an organizational point of view, artificial intelligence is a tool which is supposed to support analysis of data (organizational surrounding) and, as a result, decision-making processes (Tejeda *et al*., 2022; Abels *et al*., 2025; Nashed *et al*., 2025; Alufaisan *et al*., 2021).

AI technology consists of a few basic levels, which at the same time show its development:

1. Machine learning – it bases on training an algorithm (exploiting available data) to make predictions or decisions. Consequently, it is able to create models. The most basic models are created through *supervised learning,* which exploits data sets to train algorithms to classify data or predict correct outcomes. However, the more advanced type of an algorithm is called a *neural network* and it is

modelled after the human brain's structure and function. It allows coping with tasks that require identifying complex patterns and relationships in large amounts of data (Hemmer *et al*., 2022; Luong *et al*., 2014; Szegedy *et. al.*, 2013).

2. Deep learning – it is a part of machine learning that exploits multi-layered neural networks. Unlike basic machine learning, it enables *unsupervised learning*, which involves automating the extraction of features from unstructured data sets and creating own predictions and interpretations. Generally deep learning is designed for solving problems that require fast and precise identification of complex patterns and relationships in large amounts of data (Hornischer and Terzopoulou, 2025; Echterhoff *et al*., 2022).

3. Generative AI (gen AI) – it is a tool that uses deep learning models which are able to create complex original content (e.g., long-form text, complex images or realistic video). Generative models base on so-called foundation models that are created through training of deep learning algorithms on huge volumes of unstructured, unlabelled data. Then the model is tuned in order to adapt it to a specific application (Yu *et al*., 2025). Developers and users of gen AI applications regularly assess the outputs and tune the model further, to make it more accurate and precise.

All these more and more sophisticated models ultimately have led to creation of an AI agent and, as a consequence, an agentic AI system. An AI agent represents an autonomous AI program; it designs its own workflow and is able to do complex tasks without human intervention. This idea developed into a multiple AI agents system (agentic AI) that coordinates work of many AI agents (Caballero Testón and Moreno, 2025). Such a combination of potential of individual agents enhance further the scale and complexity of accomplished tasks.

Referring to the organizational and business context, potential benefits of using AI technology are huge. Although depending on a sector or a field of implementation the benefits may vary, generally scientists and practitioners agree that AI technology most of all allows faster and more efficient analysis of data and supports decision-making processes (Hornischer and Terzopoulou, 2025; Schoeffer *et al.*, 2025; Cabitza *et al.*, 2023; Echterhoff *et al*., 2022). It reduces physical risk and human errors. From a technical point of view, AI tools automate repetitive tasks and can operate without breaks.

AI technology can support various organizational and managerial processes. For instance, today it is vastly used in communication with customers (chatbots, virtual assistants etc.) and to expand automation. It serves as a great help in preventive maintenance to predict equipment failures. Also, managers implement deep learning algorithms in marketing to create personalized customer experiences and marketing campaigns, and in human resource departments to speed up recruitment processes.

However, at this point it is crucial to stress that all tools basing on AI technology require access to data and sharing (coordinating) it between organizational units. In case of network collaboration between independent organizations, processes of collecting, sharing and analysing data may be far more difficult.

The character of network (especially its flexibility potential, temporary configurations and often informal relations between partners) does not support these mechanisms. Therefore, it is important to diagnose and analyse conditions and potential benefits of using artificial intelligence tools within network collaboration.

2.2 Conditions of Taking Advantage of AI Tools within Network

When considering conditions of taking advantage of AI tools within network, first of all we should ask the question whether this exploitation is at all possible. It seems crucial to realize that inter-organizational network consists of separate, individual units, which may vary considerably in terms of various internal elements such as: strategy, nature of the market they operate on, norms, values etc.

What is more, collaboration within network is often temporary; organizations cooperate in order to realize some project or task, after which the collaboration becomes suspended until another project or task is initiated. That leads to a natural, permanent reconfiguration of knots, since each project may require participation of organizations with different competences (He *et al.*, 2020; Pedersen *et al.*, 2022). Finally, relations between partners can base not only on formal contracts, but also have an informal character, which further enhances flexibility and complexity of network (Tyagi *et al.,* 2023).

Thus, taking into account the character of network collaboration, it may be concluded that it is not favourable in terms of integrating exploitation of artificial intelligence tools. Dynamic and semi-informal nature of network makes it difficult to build mechanisms of systematic collecting and sharing information and data.

This leads to an interesting paradox – on one hand AI contributes to making structures more dynamic (by supporting constant adjustment to changes in organizational environment), on the other hand, however, these dynamic competences make it more difficult to build and make use of common data base.

While the potential of AI tools can be exploited fully by an individual organization, in case of inter-organizational network some considerable barriers appear (though they can be smaller when network collaboration becomes long-term and formal, for instance in case of strategic alliances or clusters).

Referring to the question of possibilities of using AI tools within network, to the vast degree it amounts to the issue of working out mechanisms of common collecting and sharing information.

2.3 Benefits from AI Technology Gained by Network Participants

Although the nature of inter-organizational network collaboration makes it very demanding in terms of consistent exploitation of AI tools, this technology definitely is a game changer and it will be implemented by various organizations which operate within different collaboration schemes.

Therefore, it is important to assess how artificial intelligence tools can contribute to achieving benefits by organizations collaborating within network. To be able to do it, I identified the types of benefits (rents) which can be gained from network collaboration.

2.4 Collaborative Advantage

In order to understand the benefits fully, however, first it is necessary to explain the idea of collaborative advantage. It represents one of the key reasons for initiating and strengthening inter-organizational collaboration, which supports generating value for an organization's stakeholders. In the literature there are numerous analyses presenting various ways of building value. Often it is suggested that it ought to be created by building value which leads to collaborative advantage (Huxham and Vangen, 2005; Huxham and Vangen, 2000).

What seems especially interesting, collaborative advantage is perceived as a fundamental reason for initiating cooperation between organizations which represent different sectors (Vangen and Huxham, 2012). Moreover, according to the inter-organizational cooperation concept proposed by E. Trist, collaborative advantage becomes an important value for an organization on condition that it faces a so-called meta-problem, which is understood as a problem that cannot be solved by any organization individually (Trist, 1983).

Therefore, in order to be able to take advantage from building collaborative advantage, it is necessary to initiate inter-organizational cooperation, in the situations when thanks to this partnership organizational objectives can be achieved more efficiently than if a company operated separately (Vangen and Huxham, 2010).

Studies concerning collaborative advantage and inter-organizational cooperation explore various aspects and different perspectives. Although some research has a more general character and it just refers to managing cooperation (Kanter, 1994), more often researchers concentrate on the ways of achieving set results of collaboration between organizations more efficiently.

As a consequence, they focus on understanding and improving partnership relations (Lasker *et al.*, 2001; Gray, 1985; Vangen and Huxham, 2003, 2010). It shows that gaining benefits from collaborative advantage constitutes one of key reasons for developing cooperation between organizations.

It ought to be stressed that collaborative advantage is often referred to the concept of added value, since it has a considerable influence on creating new value (Klijn and Teisman, 2005; Vangen and Huxham, 2013).

Collaborative advantage is defined by many researchers and they present different perspectives or elements (Blomgren Bingham and O'Leary, 2008; Huxham *et al.*, 2000; Greve *et al.*, 2014). Below I present how they understand its very idea:

- collaborative advantage concerns creating synergy between collaborating organizations; it will be achieved when something creative appears, something which an organization could not build individually, and when each organization (thanks to collaboration) is able to achieve their own objectives more efficiently than if they operated separately (Huxham and Macdonald, 1992, Huxham, 1993),

- it is a process which enables independent units and organizations to join their human and material resources, in order to be able to achieve objectives impossible to realize individually (Lasker *et al.*, 2001),

- results achieved thanks to collaboration and synergy, impossible to achieve without these two elements (Hibbert and Huxham, 2005).

Although the above-mentioned definitions stress different aspects of a successful collaboration, generally it can be concluded that collaborative advantage represents some benefit which an organization gains from cooperating with other units, which would not be accessible without building and developing close, partnership relations (Huxham, 1996; Lank, 2007; O'Leary, 2016).

2.5 Network and Relational Rent

In order to present the types of benefit in question, it is important to refer to the idea of economic rent. It allows determining effectiveness of an organizational strategy. Historically it was interpreted in various ways; it was related to searching for better position on a market, increase in an organization's value, resource optimization or gain stemming from innovations (Horn, 2018).

However, measuring effectiveness of inter-organizational network is more difficult (Lucidarme *et al.*, 2015; Mu *et al.*, 2018). Traditional methods are too simplistic, because network participants focus on building strong relationships and achieving intangible outcomes, such as trust and reciprocity (Klaster *et al.*, 2017).

It is vital to identify the benefits which correspond with the very idea of the network interactions and reflect the complexity of expectations and motivations of collaborating organizations.

Therefore, in case of collaborative advantage generated by network, the synergy effect leads to creating unique value for both the whole network and individual participants. In other words, there can be identified two basic types of economic rent: network rent and relational rent.

Network rent constitutes an advantage that can be achieved by an *individual* participant of network, which reflects an egocentric perspective. The literature review shows different approaches to presenting concrete types of this benefit, since it depends on the context of the research. However, concluding these considerations it is possible to identify following benefits gained by a network participant:

- rent from participating in network of value - value within network is generated through the synergy of key resources and actions delivered by collaborating partners. It ought to be stressed that this rent refers only to the situation in which an organization creates value for itself (apart from co-creating value for the whole network). For instance, an organization can exploit network logistics channels for its own purposes.

- rent from creating and diffusing knowledge - it refers to the ability to create hidden knowledge and to diffuse it to other network members. The knowledge sharing is supported mostly by a relational approach to collaborative work; it means that network partners will be more effective when they have the possibility to come together and learn about one another. What is more, it is supported by specific features of network itself (Whetsell *et al.*, 2020), especially when there are substantial differences between network participants in terms of possessed and controlled knowledge resources,

- rent from creating dynamic abilities – dynamic abilities refer to the skill of integrating, building and reconfiguring competencies, which allows adjusting to fast changes in organizational surrounding (Teece *et al.*, 1997). The abilities are perceived as some routines, both operational and strategic, thanks to which an organization is able to reconfigure its own resources (Eisenhardt and Martin, 2000). Within inter-organizational networks, this type of benefit derives from networks' unique features, such as: network structure's flexibility, skills for fast reconfiguration, lack of hierarchical dependencies and coexistence of formal and informal relations,

- rent from convergence processes – the convergence effect within network is understood as a situation in which some network member with a weaker position on a market develops faster than other network participants with a better position, and ultimately it achieves similar market position. Basing on objective criteria of differences between units, network members are able to assess the scale of this catch-up effect,

- rent from lower transactional and hierarchical costs - lower transactional costs are possible because of network contracting (formal or informal), which replaces traditional contracts. Network contracting may refer to e.g., verifying accessibility of goods on a market or comparing offers. Regarding hierarchical costs, they reflect benefits from replacing hierarchical structures by network coordination. It is important to underline that this rent refers only to potential benefits from decreasing operational costs, and *not* from generating surplus by network,

- network effect – this benefit bases on the idea that the gain for all network members grows as the number of its participants increases, since each new member creates additional value for the whole network (Church *et al.*, 2008),

- rent from appropriating value created by other participants of network – in the context of network collaboration, appropriation can be understood in two ways: 1) taking over some value generated by other members of network; 2) keeping for an organization (not sharing) the value which was created by the unit itself (Najda-Janoszka, 2016). Within network, appropriation mainly concerns taking over not material assets, but knowledge. It may be done both in legal ways through contracts, licenses or franchising, and illegally (e.g. by taking over hidden knowledge).

Another type of benefit relates to an advantage from *the whole network's* perspective (gained by network as a whole). This *relational rent* consists of the following kinds of benefit:

- resource oriented (Ricardian) – it represents some advantage from having an access and exploiting valuable, rare resources (Ricardo, 1817). The gain depends on the relation between demand and supply for some resource. Generally companies focus on seeking rare resources and then exploiting them in an efficient way (Niemczyk, 2013). As for the network collaboration, it benefits from having and disposing such rare resources. Within inter-organizational networks, the key resource is the knowledge which is created in the process of group learning (Peteraf, 1993). The resource oriented rent also can be understood more generally as some benefit from having advantage over organizations which operate outside network,

- monopolistic – benefit from having privileged position on a market (in a sector), which leads to limiting competition, e.g. by creating barriers for entering a market by other organizations. At this point it is important to stress that the Ricardian rent is not enough to identify true sources of generated value, because the value depends not only on efficiency mechanisms. The network gains rent from having better competitive position on a market (Stańczyk-Hugiet and Sus, 2012) and from creating rarity. Monopolistic rent is quite common within *public* networks (networks in which at least one participant is a

public unit), since it may take advantage from the fact that public organizations have a privileged position which stems from legal regulations,

- innovative (Schumpeterian) – it constitutes some gain generated by innovations (Schumpeter, 2003). Innovation itself ought to be perceived in a very wide meaning; it may be related to a product itself, but also development of technology, structures, processes etc. The benefits comes from organizational dynamic abilities to identify and implement creative solutions. As for inter-organizational networks, such advantage often results from the synergy of specific features, resources and competences of organizations representing different sectors. Possibilities of developing flexibility and fast reactions to changes consequently leads to achieving advantage which bases on difficult-to-imitate differences between network and units operating outside network,

- entrepreneurial, managerial – the rent refers to features and behaviour of an entrepreneur, to the ability to re-configure available resources in a creative way. The managerial aspect of this rent concerns exploitation of managerial knowledge, skills and competences, which are difficult to imitate. In case of networks, it appears as a result of generating synergy from entrepreneurial and managerial actions of all network participants,

- organizational – it appears as a consequence of collaboration between organizations which implement and exploit different management systems. Although making such an cooperation effective may be very difficult, the synergy effect leading to creation of value which is unique and difficult to imitate may appear on the grounds of well thought out interactions of specific features of network members. High potential of such an advantage lays especially in collaboration of units representing different sectors,

- E. Penrose's rent – E. Penrose proposes a slightly different understanding of relational rent; it refers to the possibility of more effective exploitation of the resources which are disposable by network participants. The gain stems not from the very fact of having joined resources, but from the possibility of initiating inner synergy effect. It means that network as a whole is capable of using all resources delivered by network participants more efficiently than if they were used individually.

3. Research Methodology

In this research I adopted the interpretative paradigm perspective, which allows understanding fully the phenomenon in some particular context (Eisenhardt and Graebner, 2007). The situational context determined the research results in the analysed organization, but at the same time it constituted a base for presenting characteristics of the whole class of researched objects (Yin, 2014).

Following this reasoning, the research is based on the methodological rigor of a qualitative research method, represented by a case study (Yin, 2014; Eisenhardt, 1991). This choice corresponds with the above-stated research objectives and what is currently known about scrutinized problems (Graebner *et al*., 2012). Inter-organizational networks are still a relatively new phenomenon, conditioned by many variables. Their nature requires a thorough examination, including conditions of gaining benefits by organizations collaborating within network.

The article carried out a case research which provided data corresponding with a set of research questions. The results were referred to internal documents analysis. As a result, it was possible to make some theoretical generalizations concerning the conditions of taking advantage of AI tools within network collaboration and their contribution to gaining relational rent and network rent by network participants. Within the procedure, I used the statistical method of clustering, which allowed me to operationalize benefits which organizations gain from participating in networks (benefits were clustered according to two perspectives: of the individual participant of network and of the whole network).

Basing on the procedure presented by Flyvbjerg (2012), I implemented the following main criteria of selecting the case:

- clarity of case – this criterion refers to two conditions: 1) researched organization is an active member of inter-organizational network; 2) organization exploits some elements of artificial intelligence technology. Hence, collected data bases on real experience, which ensures its reliability,

- access to crucial data – it refers to the possibility of carrying out an interview and analysing internal documents.

The studied case was a production and trade organization located in Poland, but operating internationally (in terms of both suppliers and buyers). What is important, it collaborates not only with business units, but also with public organizations and NGOs. Such a diversity served as a base for a complex and consistent analysis of the researched phenomena.

As the case study method is characterized by complexity of the analysed phenomena and variety of information, I implemented the strategy of triangulation of gathering data methods (Yin, 2014). These methods were: expert interview and analysis of documents.

As for the interview, it was carried out with the managing director. The article used semi-structured forms which allowed identifying AI tools contribution to gaining different kinds of benefit within network collaboration (which corresponds with the results presented in Table 1).

As for the documents analysis, it included operational and statistical reports. It allowed me to confront the gathered data with the information provided by the interviewee.

The interview was transcribed and analysed (Miles and Huberman, 2014). According to the methodological rigor, the qualitative data was: 1) reduced – the interview was transcribed and the whole material was coded according to adopted conceptual frames (*a priori* codes); 2) displayed – the codes (benefits from network collaboration) were particularized and ordered; 3) verified – the empirical data was interpreted with reference to literature concepts and theories.

Correctness and trustworthiness of the research was ensured by fulfilling three evaluation criteria for qualitative research, which stem from the methodological rigor: credibility, transferability and confirmability. Credibility (presenting a real picture of the investigated phenomena) was ensured by:

- interviewing a person who has in-depth knowledge of the researched phenomena (he collaborates within inter-organizational network and has an experience in using AI technology),
- conducting an interview in time and place convenient for the interviewee, in this way providing conditions to speak freely,
- iterative collection of data and detailed analysis of the material.

Transferability (understood as a possibility of formulating some recommendations for other units which were not subject to research in question) was met by presenting the contextual aspect of the research and explaining in what way the research results may be useful for other organizations which participate in network collaboration and exploit artificial intelligence technology.

Finally, confirmability means ensuring that the findings are strictly correlated with the collected data and that the risk of potential subjective assessment of the researcher is minimized. This criterion was met by using triangulation of methods (interview, documents analysis) (Mason, 2018) and a thorough description of the methodological perspective in relation to the empirical findings.

4. Research Results and Discussion

4.1 Artificial Intelligence Contribution

The above classification of rents constitutes a base for analysing how AI tools can contribute to gaining different kinds of benefit within network collaboration. Results of this assessment were presented synthetically in Table 1.

Table 1. *Artificial intelligence tools' contribution to gaining benefits within network collaboration*

Type of rent	**AI technology contribution**	**Remarks**
Network rent: Rent from participating in network of value	supports optimizing value chain	indirect impact
Rent from creating and diffusing knowledge	supports analysis of data and decision-making processes by: - training algorithms to classify data or predict correct outcomes (*supervised learning*) - identifying complex patterns and relationships in large amounts of data (*neural network*) - automating the extraction of features from unstructured data sets and creating own predictions and interpretations (*unsupervised learning*) - using deep learning models to create complex original content (generative AI) - designing autonomous workflow; doing complex tasks without human intervention (AI agents)	complex support
Rent from creating dynamic abilities	supports flexibility (reconfiguration competences) of network by fastening data analysis and decision-making processes, thanks to: training algorithms; identifying complex patterns; automation of processing data and workflow; creating complex original content	complex support
Rent from convergence processes	increases efficiency of operating, which supports a catch-up effect (it results from an access to AI tools used by other network participants)	indirect impact
Rent from lower transactional and hierarchical costs	supports optimizing network structures	indirect impact
Network effect	supports efficiency of data analysis and decision-making processes as the number of network participants increases	indirect impact
Rent from appropriating value created by other participants of network	*perspective of appropriating unit*: supports assessing value-creating processes (where and how value is created) in order to intercept value; *perspective of other network participants*: supports detection and prevention from appropriating processes	negative impact for an appropriating unit
Relational rent: Resource oriented (Ricardian)	supports coordinating exploitation of resources by all network participants	indirect impact
Monopolistic	supports strengthening competitive position on a market and creating rarity	indirect impact
Innovative (Schumpeterian)	supports learning from new information and experience;	complex support

	supports identification and implementation of creative solutions, using: training algorithms; identifying complex patterns; automation of processing data and workflow; creating complex original content	
Entrepreneurial, managerial	supports exploitation of managerial knowledge, skills and competences provided by all network members by: training algorithms; identifying complex patterns; learning models to create original content; automation of processing data and workflow; delegating complex tasks to AI agents	complex support
Organizational	supports effective combining and taking advantage of different management systems exploited by network participants	indirect impact
E. Penrose's rent	supports inner synergy effect from common exploitation of resources by all network participants, thanks to: training algorithms to predict correct outcomes; identifying complex patterns; creating complex original content; automation of processing data; designing autonomous workflow; doing complex tasks without human intervention (AI agents)	complex support

Source: *Own study.*

Regarding the benefit gained by an individual participant of network, artificial intelligence tools support achieving mostly two rents: 1) from creating and diffusing knowledge; 2) from building dynamic abilities. It can be done by using the whole range of instruments, such as training algorithms, identifying complex patterns, automation of processing data and workflow, and creating complex original content (AI agents). They optimize and fasten analysis of data, decision-making processes and reconfiguration processes. They simulate the way organizations learn and understand things.

Another types of network rent, however, are supported only indirectly. It results from the character of benefits, which have a wider context and it is difficult to reduce them to a tool-like approach. For instance, the possibility of participating in network of value constitutes a general advantage stemming from the very fact of being a part of network and having an access to the process of creating value by all network members. In this case, AI technology may support the rent in question only indirectly by supporting optimization of value chain itself.

Very interesting situation takes place in case of the rent from appropriating value from other network participants. Analysing it from an appropriating unit's perspective, AI technology can make it easier to assess where and how value is created in order to intercept it.

However, looking at the problem from the perspective of other network participants (units which create value), AI tools may be used to detect and prevent from

interception attempts. Here, artificial intelligence technology can contribute to disturbing the process of gaining network benefit.

Concerning relational rents, the scale of AI technology support is quite similar to network rents. It can have a direct, complex impact on three types of benefit: 1) development of managerial and entrepreneurial competences; 2) implementation of innovative solutions; 3) achieving inner synergy effect from common exploitation of resources.

In case of the first two it is achieved mostly through learning from new information and experience, supporting human creativity, and reducing physical risk and human errors. Regarding the third benefit, additionally AI tools automate repetitive tasks and allow operating without breaks. In case of last three kinds of relational rent, possibilities of exploiting AI tools are limited and the impact can be rather indirect through improving efficiency of organizational and managerial processes which take place within network.

5. Conclusions, Proposals, Recommendations

Basing on the research results, I was able to identify conditions and benefits of using AI technology within network collaboration. It led to the following conclusions:

1. The character of network collaboration generally is not favourable in terms of integrating artificial intelligence tools. Network collaboration is dynamic (constant reconfiguration of cooperating units depending on task or project), often informal, and the participants are independent units that may vary substantially in terms of a business model, norms, culture etc. This nature makes it difficult to work out mechanisms of systematic collecting, sharing and analysing information and data, which constitute a fundamental condition of efficient implementation of AI tools.

2. Regarding the way artificial intelligence tools can support gaining benefits from network collaboration, it was scrutinized from two perspectives: of an individual participant and of the whole network. It appeared that in both cases the contribution is limited: in case of network rent AI technology impact is complex in 2 out of 6 types, in case of relational rent in 3 out of 6 types. For the rest types of rents the impact is only indirect; it results from the very character of benefits, which have a wider context and cannot be reduced to a tool-like, algorithmic approach.

3. The conditions of using AI technology within network to a vast degree depend on possibilities and motivation for common collecting and sharing information. This process can be supported if two situations take place: 1) when some participant of network (an integrator) has a status which allows forcing other members to act in some way or to fulfil some requirements (such a situation is

common in so-called public networks, in which at least one participant is a public organization that acts as an integrator). Then, joining network (by a new participant) could depend on fulfilling criteria of common exploitation of AI tools (which in this case mean collecting and sharing data that feed AI algorithms); 2) when joining network is not fully voluntary, because some organization can be dependent on resources controlled by network (other network participants). In this situation, in order to get the access to the resources, the organization will be forced to adjust to the rules of exploiting AI tools within network.

In both cases, it ought to be stressed that these mechanisms will work only on the condition that potential benefits from joining network surpass costs of implementing and following rules of AI technology exploitation.

4. Under some circumstances a destructive mechanism can appear, which may limit efficient implementation of AI technology within network; when an organization which would like to join network uses AI tools, but other network participants are not interested in implementing and integrating this technology. This will lead to a so-called negative adjustment. Here, we can raise a vital question concerning a scale of negative influence on an individual unit (a knot) by the whole network.

   Another similar problem concerns the technological exclusion; some organization may wish to join network (which exploits AI tools), but it does not use this technology and it constitutes a substantial barrier, since the cost of building data base and creating artificial intelligence tools may be too high. For instance, such a situation can take place in case of non-governmental organizations which would like to join public networks; NGOs (especially the ones operating on a local scale) often cannot afford implementation of AI technology.

Regarding theoretical contribution of the study, it expands our understanding of conditions and potential benefits from implementing artificial intelligence technology within inter-organizational networks. I presented a concise theoretical construct which explains possibilities and scale of taking advantage of AI tools, referring it to the specificity of benefits from network collaboration (including division into network and relational rent). As for practical contribution, these considerations may serve as a guideline for managers who perceive AI technology as a vital factor that can support increase in efficiency of inter-organizational network collaboration.

As for the limitations of the paper, it ought to be noticed that although implemented research methods provided all expected data which led to achieving research objectives, natural character of case studies requires cautiousness concerning the scale of generalizing results. My intention was to deepen our understanding of some

phenomenon which has not yet been fully identified and explored. The limitations should be treated as a starting point for further scientific explorations (Yin, 2014).

Apart from the suggestions expressed in the above conclusions, I would recommend expanding the research area by focusing on a human factor in exploiting AI technology. Some scientists suggest that managers are reluctant to relying on artificial intelligence tools when making decisions (Dunning *et al*., 2024; Glikson and Woolley, 2020; Vereschak *et al.*, 2021).

They are afraid that AI may come up with wrong conclusions and suggestions, which will have a negative impact on an organization (Fok and Weld, 2024; Guo *et al.*, 2024). It is the managers who take the whole responsibility for outcomes and they are not willing to delegate it to some algorithm, which still represents only a tool.

The next direction of scientific explorations could lead to Necessary Condition Analysis, e.g., identifying hierarchy of AI tools (types of algorithms) in terms of influencing strength of ties between network participants. Such further studies would expand and deepen our knowledge in terms of how AI technology can increase efficiency of collaboration within network.

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