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The Information Flow between Enterprises in the Context of Sharing Economy

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Abstract:

Purpose: The aim of this research is to examine whether enterprises exchange information in the area of sharing economy, what barriers exist in the process of information exchange and what are the directions and ways to exchange information.

Design/methodology/approach: Research on the customs and habits of information exchange on available resources between entities operating in various sectors of the economy was carried out in 2019. Data on the use and exchange of property resources was obtained from enterprises in Poland. Companies for the study were selected at random, where the layers constituted the size of the company; an identical number of companies was drawn from each layer, which made it possible to study differences due to the number of employees, and on the other hand, it did not interfere with the results obtained. The primary data were collected using the CATI method. The collected empirical material was developed using specialized statistical software Statistica.

Findings: Research findings suggest that the exchange of information between enterprises is closely related to the pursuit of their own goals. They also indicate that an important role in the exchange of information about free resources is played by the trust between enterprises that are participants of the exchange process.

Practical implications: The results obtained may be useful for an information sharing platform development. They allow for better design of this platform, considering the directions and ways to exchange information and to identify barriers affecting this process.

Originality/value: The research is original because it can be used to develop future research directions, like further work concentrating on the role of trust in the process of information exchange between enterprises.

Keywords: Information flow, sharing economy, enterprise, Industry 4.0.

JEL codes: O14, O17, O1.

Paper Type: Research article.

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1. Introduction

The readiness of enterprises to implement the tasks of Industry 4.0 manifests itself, among others by implementation of tasks related to the improvement of the flow of not only physical resources but, above all, the exchange of information carrying data on these resources (Bentyn, 2017), referred to the concept of sharing economy⁴. Sharing economy is being also called as a collaborative consumption (Botsman, 2013; Botsman and Rogers, 2010a; Botsman and Rogers, 2010b), collaborative economy (Vaughan and Hawksworth, 2014), access-based consumption (Bardhi and Eckhardt, 2012; Belk, 2014), the mesh (Gansky, 2010), connected consumption (Dubois *et al.*, 2014; Schor and Fitzmaurice, 2015) and closely related to circular economy (Vaughan and Hawksworth, 2014, WEF, 2014).

The sharing economy concept was popularized by Botsman and Rogers (2010a; 2010b), and it is included in their works activities such as bartering, gifting, lending, renting and swapping, grouped in three categories as:

- product service systems (access to products and services without the need to own relevant resources),
- redistribution markets (change in resource allocation),
- collaborative lifestyles (exchange of intangible assets).

Based on the above definitions it can be assumed that the concept of sharing economy is considered in various categories - categories of suppliers and ecosystems, categories of developing ICT technologies or in social and environmental categories. Thus the most common definition of sharing economy presents that it as a socio-economic system built around the division of human and material resources, which includes the joint creation, production, distribution, trade and consumption of goods and services (*What is ...*, 2019). In other words, it is a shared economy of the main processes of resource and activity flows, in which sharing consists of temporary access to good instead of ownership, through the use of information technology development (Gesing, 2017). Sharing economy (SE) is also perceived as devices for building connections with people (or organizations) (Lessig, 2008).

The basis of SE concept is extremely dynamic and continuous development of information and communication technologies (ICT), the growing awareness of consumers and the increase in the number of collaborative online communities. The main driving force of these changes is the spread of the Internet and with it the tools and applications enabling almost "real-time" exchange of information and execution of transactions. Therefore, it is assumed that the popularity of the SE concept and its

⁴Also known as digital economy, gig economy, on-demand services, on-demand economy, platform economy, Product-Service System, freelance economy, peer economy, access economy, secondhand platform, crowd economy and second hand economy (Görög, 2018).

dynamic development results from the following accompanying phenomena: dynamic technological development, limited access to resources or shrinking resources, globalization of markets, and demographic and social changes. The spread of the Internet and the constant development of information systems meant that the cost incurred in connection with the manufacturer's direct reaching the final recipient has become exceptionally low. The modern can use resources without having their ownership, becoming an alternative to traditional ownership. IS also increase the ability to download, analyze and exchange data, in addition, they enable the construction of platforms and the participation of network-connected entities (Daugherty *et al.*, 2016). IS together with many applications, platforms and other systems, widely used in the framework of sharing economy, also contribute to reducing the level of consumption for sustainable development and minimizing waste. This, in turn, contributes to the fact that enterprises with excess resources or production capacity can easily place these resources on the free market (Leszczyńska and Łopacinski, 2017).

But the development of IS reduced the need for physical infrastructure and resources. The use of the sharing economy concept results in numerous benefits for both sides of the information exchange, which are also market participants: reducing resource consumption, creating new business models, low operating costs, building social ties and trust between people (Ziobrowska and Kalina-Prasznic, 2017). Available technological innovations reduce transaction costs and enable the combination of free resources and demand in one place. In addition, there is a dominant belief that the concept of sharing economy reduces chaos and waste caused by disorderly and complex flow of goods. The positive impacts of this concept on environmental protection and on the society have also been observed (Public Consultation for ..., 2016), as the Institute for Sustainable Development and International Relations report showed, households using the concept of sharing economy reduce their expenses by an average of 7%, and the amount of waste they produce can fall to 20% (Sharing economy in ..., 2019). Research carried out so far shows that society's way of thinking about the value of ownership is changing.

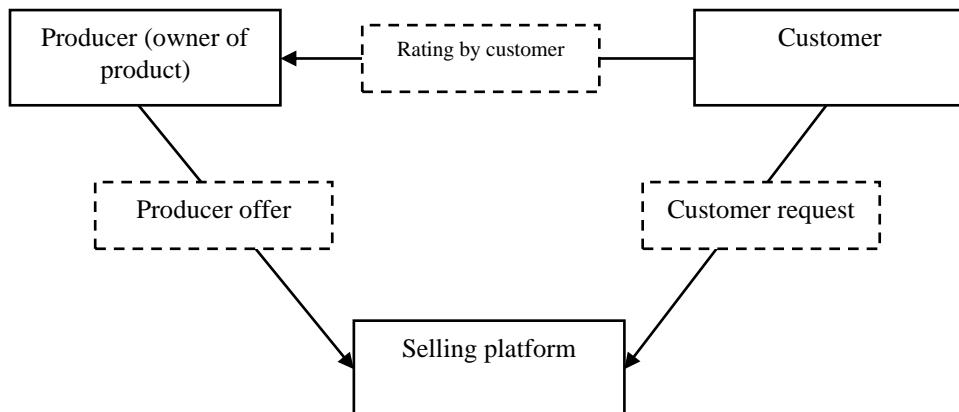
1.1 Information Flow in Sharing Economy Concept

Sharing economy requires information on process, the purpose of which is to make resource available to a specific group, must be coordinated and must be accompanied by a process of information exchange between entities interested in the exchange. Although information is a resource that can be shared, time or local restrictions have limited the extent of sharing within traditional economies. On the other hand, in modern market economies, information sharing is in digital form and online, which provides unprecedented scalability of the sharing economy (Pouri and Hilty, 2018). The real nature of information about available resources means that market participants play two equal roles - they are suppliers of services or goods, as well as resource consumers, which contributed to the emergence of a new term - prosumer (Barnes and Mattsson, 2016). This actual exchange of information also

leads to the reform of social ties by strengthening them as a part of business operations, which results in, among others, establishing connections between strangers.

Most enterprises using the sharing economy concept use platforms or applications for collecting and sharing data in real time, what maximizes the use of their resources (Lemmens and Luebkehan, 2016). Therefore, there is a need to ensure adequate information circulation under the concept of sharing economy. This need is due to the desire to maximize the use of physical resources and gain access to more potential buyers through online markets. The basic principle of effective wealth management is striving to make the best use of the resources, as this is an important factor affecting the economic efficiency of business. The condition is to organize an efficient system, ensure efficient communication channels and the necessary level of transaction security. The ideal sharing economy model assumes a high degree of computerization, whose main motivation will be the flow of information. It is already known that the majority of sharing economy activities in the aspect of information exchange take place in a digital environment, at minimal intervals. In such an information flow (Figure 1) the main entities are the producer and the client (solid lines) and the subject is information (break lines).

Figure 1. Information flow and the sharing economy.



Source: Own research.

In this case, the information system may take the form of a sales platform operating as an online market, where two entities willing to exchange resources meet (Mesarc, 2018). The use of such a platform for the exchange of information about resources may be dictated by the fact that individual enterprises do not have a database of potential recipients of the resources offered. The flow of information itself is an important criterion for the smooth functioning of various areas of business activity, however, based on the analysis of available literature, it becomes possible to put the following research questions (RQ):

RQ1: Do enterprises exchange information about free resources?

RQ2: What are the barriers for exchanging information about resources?

RQ3: What enables the exchange of information about free resources and what blocks it?

The purpose of this article is to examine whether enterprises exchange information in the area of sharing economy, what are the barriers affecting the information exchange process and what are the directions and ways of exchanging information. The article reports the results of the research conducted among Polish enterprises.

2. Methodology

The exchange of information is one of the basic conditions for the exchange and sharing of resources between enterprises. The article reports the results obtained from the research conducted among Polish enterprises. The time range of collected research materials is the year 2019. Data on the use and exchange of property resources were obtained from enterprises that operate in Poland. Companies for the study were selected at random. The sample selection consisted of several stages:

- 1) Defining the research collectivity - the observations and analyzes of previous studies did not identify specific industries or areas of activity, among which there is a systematic exchange of resources, therefore all companies operating in Poland were selected for the research regardless of the type or scope of activity.
- 2) Determining the sampling frame in the database based on the company's address.
- 3) Determining the sample size - for the confidence level at 0.95 and a maximum error of 0.521, the minimum sample size was set at the level of 352 enterprises.
- 4) Selection of the draw method - random stratified selection was selected, where the layers constituted the company's size; an identical number of companies was drawn from each layer, which made it possible to study differences due to the number of employees, and on the other hand, it did not interfere with the results obtained.

Primary data were collected using the CATI method. This method allowed for the collection of a large amount of data over a period of two months. The person conducting the telephone interview with a representative (owner or senior manager) of the company used a ready-made questionnaire, which consisted of questions and metrics. The obtained answers were the basis for answering the research questions posed. The collected empirical material was developed using specialized statistical software Statistica. As a result of the research, information was collected on the customs and habits of exchanging information on available resources between entities operating in various sectors of the economy. The main purpose of the conducted research was to check whether companies have temporarily free resources that could be exchanged for a specific period.

The preliminary results confirmed that companies, irrespective of size and industry, have assets that do not fully use in their activities, but cannot sell them due to their

periodic use. Almost every third surveyed enterprise has to some extent unused assets that could be managed based on mutual exchange with other entities. At the same time, the results showed that 63% of entities do not share their assets or do not use the assets of other companies. The conducted research assumed that the method of information exchange is not enough to fully utilize temporarily free resources in business transactions. Preliminary analyses have identified the following areas related to the exchange of information about resources between various enterprises:

Area 1: Sharing resources.

Area 2: Barriers to sharing resources.

The goal adopted in the article was achieved using response frequency distributions and by testing the relationship between selected variables using the chi-square test and contingency tables.

3. Research Analyses and Results

3.1 Ways and Barriers to Exchange Information on Temporarily Free Resources

Research conducted at the beginning of 2019 in Poland indicates that the exchange of information is one of the problems of exchanging and sharing enterprise resources. Firstly, an analysis of the distribution of responses was made within the identified areas of information flow (Table 1).

Table 1. Information sharing.

Does the company share information regarding the location, nature and availability of its resources?	Percentage of indications
<ul style="list-style-type: none"> • Yes, I discuss it to my direct business partners 	40.3 %
<ul style="list-style-type: none"> • Yes, I provide information on the general market 	22.2 %
<ul style="list-style-type: none"> • I received this kind of information from other companies 	19.3 %

Source: Own research.

Representatives of the surveyed enterprises, when asked whether they share information on the location, nature and availability of their resources, showed a rather negative approach to such a concept of cooperation. Almost half of the entities conduct such talks only in the immediate business group (40.3%). At the same time, only every fifth company provides such information on the market and only slightly less receives such information from outside. This means that the exchange of information on the resources held usually relates to the close business environment. Despite this, in the case of a small group of companies there is a process of exchanging information on free resources. At the same time, this confirms the assumption that the companies have unnecessary assets and therefore there is a need for mutual exchange and cooperation in this respect.

However, there are some barriers that limit the involvement in an efficient information flow process in the study area (Table 2).

Table 2. Barriers to sharing information on resources.

Barriers to sharing information regarding the availability of own resources	Percentage of indications
• It is difficult to find companies that want to cooperate by sharing	76 %
• Sharing resources supports competition	68 %
• There is no information about available resources from other	63 %
• Lack of trust in contractors	67 %
• Sharing is possible only in the case of outsourcing relations	55 %
• This would be a negative sign for my company	47 %

Source: Own research.

Most surveyed companies declare that it is difficult for them to find a company that would like to exchange resources. This is confirmed by the fact that more than half of the companies do not have information about the resources of other companies (63%). This condition is mainly due to fears of supporting this way their own competition (68%), lack of trust in business partners (67%) and due to the potentially negative perception of such a company (47%). Half of the companies agree to exchange resources and related information only in outsourcing relations. In the understanding of this approach, there is a conviction that the temporary or permanent possession of free resources indicates a poor economy of the enterprise having it or about financial problems. This, in turn, for large enterprises can negatively affect the reactions of current and future investors. On the other hand, enterprises do not see the problem that hiding free resources indicates their mismanagement. In such a situation, it seems rational and safe to inform about free resources outside of own industry. It was checked whether it was possible to exchange information in the same industry or whether it was rather perceived as another problem (Table 3).

Table 3. Lack of information sharing on resources by industry.

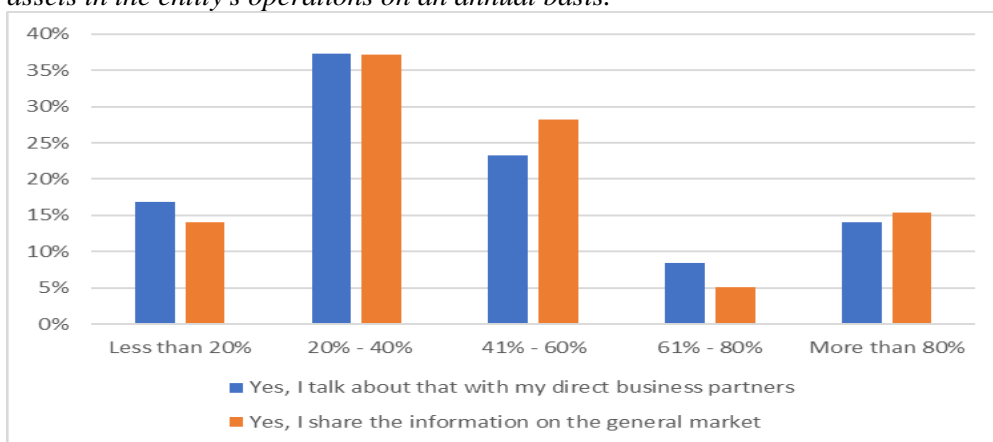
There is no information on available resources from other companies in our industry	Percentage of indications	The most frequently indicated type of industry
• This applies to our industry	24.4 %	Electronic
• This is marginal in our industry	25.0 %	Construction
• This is especially true for our industry	13.1 %	IT
• This does not apply to our industry	37.5 %	Financial services, insurance, education

Source: Own research.

Lack of information about available resources due to industries applies to every fourth enterprise. At the same time, it is usually a marginal phenomenon in the case of 25% of companies and frequent in the case of 13% of surveyed companies. Lack of exchange of information about resources due to the industry does not apply to a significant part of entities (37.5%), which means that the industry is not the most important barrier for the exchange of information about resources, especially when the scope of entities activities includes the service sector.

Next, it was examined how the structure of resources held, due to the period of its use in the entity's annual activities, affects the willingness to disseminate information about free resources. At the beginning of the research part it was indicated that the surveyed companies declare having free resources, regardless of whether they are temporary, e.g., seasonal, or continuous. Figures 2 and 3 present a summary of responses because there is a flow of information about resources depending on the structure of resources used in the activity only temporarily (Figure 2) or continuously (Figure 3).

Figure 1. Information exchange process due to the structure of the use of temporary assets in the entity's operations on an annual basis.



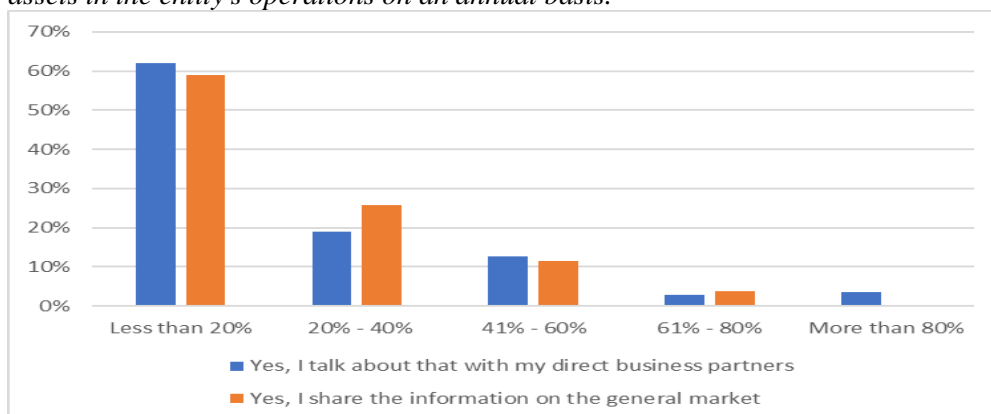
Source: Own research.

Considering that companies only own and use resources at a certain / selected time during the year, three groups of companies can be observed due to the way they share information about their free resources:

- Companies with less than 20% or 61% to 80% of such resources more often exchange information about them (these resources) only with direct business partners.
- Companies with such temporary resources at the level of 41% to 60% or more than 80% usually provide information about free resources on the general market.

- Companies whose temporary resources occupy 20% to 40% simultaneously provide information about free resources to their partners and on the general market.

Figure 3. Information exchange process due to the structure of the continuous use of assets in the entity's operations on an annual basis.



Source: Own research.

In turn, analyzing the situation when companies own and use resources continuously throughout the year, we can observe 3 groups of companies due to the way they share information about their free resources:

- Companies that have less than 20% or from 41% to 60% of such resources more often exchange information about them (these resources) only with direct business partners.
- Companies with such continuous resources at the level of 20% to 40% or 61% to 80% usually provide information on free resources on the general market.
- Companies whose continuous resources occupy more than 80%, provide information on free resources only to their business partners.

At the same time, companies were also asked what types of resources should be shared among economic entities. The distribution of answers is presented in Table 4.

Table 4. Type of resources about which information should be provided.

Types of resources for which information should be shared	Percentage of indications
• Rare and unique	24.4%
• Common and available	31.8%
• Unique for the sector	43.8%

Source: Own research.

Almost half of the surveyed companies believe that the information exchange process should cover unique resources within the industry. Every third entity believes that these resources can be universal and available. In every fourth entity it is believed that information on the availability of rare and unique resources should be exchanged. This means that any information exchange model should be created due to the unique resources of an industry.

3.2 Conditions of the Information Exchange Process

The results from the area of sharing information about resources prove that the process of information flow between enterprises exists and serves to exchange material resources, even despite numerous barriers. The fact of this phenomenon has marked the next step of research, whose goals were to indicate what phenomena are conducive to the exchange of information between enterprises, and what discourages them to implement such activities. To receive the answers, the following variables were defined presenting three possible variants related to the studied phenomenon:

- P10_2 – means the process of sharing information on the availability of own resources with other companies.
- P9_5 and P10_3 – means sharing information on own free resources.

The next step was to indicate which explanatory variables coexist significantly with the defined explanatory variables. Due to the qualitative nature of the data, the Pearson's correlation coefficient, also called the linear correlation coefficient, was used to estimate the significance of relationships between variables. The correlation coefficients take values between -1 and +1, where the value +1 means excellent positive correlation. Significant correlations were adopted for the level of significance p less than 0.05. First, the relationships – the correlation study in Table 5 – were examined between variable P10_2 (access to information on resources in the general market) and variables:

P8: Direction and method of information exchange,

P17: The level of material resources used continuously.

Table 5. Correlations between variable P10_2 and selected variables.

Variables	P10_2 (access to information on resources in the general market)
P8_1 (The company temporarily provides its assets to other companies)	0.06114
P8_2 (The company temporarily uses assets from other companies)	0.12400*
P8_3 (The company does not share its assets)	0.04391
P8_4 (The company does not use the assets of other companies)	-0.09692

P8_5 (The company partially shares its assets with other companies)	0.00725
P8_6 (The company partly uses assets of other companies)	-0.01489
P8_7 (Sharing applies only to entities in outsourcing with the company)	-0.13962*
P17 (The level of material resources used continuously)	-0.11087*

Note: * significant relations for $p < 0,05$.

Source: Own research.

Despite the identification of significant pairs of variables, the Pearson correlation coefficient for $p < 0.05$ is less than 0.2 for $N = 352$. This means that the examined variables have little impact on each other. On this basis, it can be concluded that the exchange of information about resources in the general market does not affect the direction and manner of flow of such information. The structure of owned resources continuously used in the company does not affect it also. The relationships were further examined between variable P10_3 (unwillingness to exchange information on resources) and variables (Table 6):

P3: Types of resources that remain mostly unused on an annual basis.

Table 6. Correlations between variable P10_3 and selected variables.

Variables	P10_3 (unwillingness to exchange information on resources)
P3_1 (Fleet)	0.01307
P3_2 (Buildings)	-0.11816*
P3_3 (Lands)	0.00650
P3_4 (Machines and equipment)	0.02098
P3_5 (Software licenses)	-0.00573
P3_6 (Stocks of raw materials, materials and semi-finished products)	0.06565
P3_7 (Ancillary stocks)	-0.11667*

Note: * significant relations for $p < 0,05$.

Source: Own research.

The situation is the same for the next explained variable P10_3. The value of $r < 0.2$ means that the lack of information exchange on resources on the general market does not depend on the type of resources not used in the company. This means that companies, although they may have free resources, are reluctant to share information about it with all market participants. Finally, the relationships were examined between variable P9_5 (exchange of information about resources within the industry) and variables (Table 7):

P7: Goals of sharing assets with other companies.

P12: Type of resources that should be shared among business partners: rare and unique; common and available, unique to the industry.

Table 7. Correlations between variable P9_5 and selected variables.

Variables	P9_5 (exchange of information about resources within the industry)
P7_1 (Implementation of the concept of sustainable development by reducing unnecessary assets in the company)	-0.33883*
P7_2 (Increased business flexibility through easier release of fixed assets)	-0.32333*
P7_3 (Including the actual cost of resources engaged in products and services)	-0.31148
P7_4 (Increase of unused resource potential)	-0.32326*
P7_5 (Eliminate some brokers)	0.03143
P7_6 (Reduction of transaction costs related to fixed assets management)	-0.04899
P7_7 (Gaining a new source of income)	0.00048
P12 (Type of resources that should be shared among business partners)	-0.28635*

Note: * significant relations for $p < 0,05$.

Source: Own research.

Four variables have been identified that significantly coexist with the phenomenon of information exchange within the industry. For $p < 0.005$, the value of $r = 0.3$ and $N = 352$ means the average mutual influence of the studied variables. Enterprises whose purpose of resource exchange is to implement the concept of sustainable development, increase in business flexibility and increase in the potential of unused resources, they willingly exchange information about free resources within their own industry. For $p < 0.005$, the value of $r = 0.28$ and $N = 352$ means that companies are also encouraged to exchange information by the type of resources that can be made available in the industry.

4. Conclusions

Currently, sharing economy concept plays a significant role for the modern economy, and constant development of IS has largely contributed to the dissemination of this concept, enabling rapid and accurate exchange of information between entities. The research shows that modern companies exchange information with each other, thus pointing to the implementation of sharing economy concept within the framework of their activities. Based on the conducted research, it became possible to formulate the following conclusions:

1) Companies have unnecessary resources, which encourages companies to exchange information about these resources in order to make them available, which in turn creates the need for mutual exchange and cooperation.

- 2) The information exchange process is more common in companies that have a 20% to 60% share of temporary resources or a 20% share of resources that are constantly used.
- 3) Companies are reluctant to share information regarding the location, nature and availability of their resources. Less than half of them make such an exchange only in the immediate business group and only 1/5 of them make such information available on the general market.
- 4) Companies are reluctant to share information on free resources with companies operating outside their industry.
- 5) The information exchange process itself faces several barriers that make it difficult to get involved in an efficient information flow process, mainly all companies find it difficult to find a partner willing to exchange resources with each other. This is mainly due to fears of supporting their own competition in this way and a lack of confidence in potential business partners.
- 6) The information exchange process should cover, in particular, unique resources within the industry, which indicates that the information exchange model should be created due to the unique resources of a specific industry, which will make the exchange process easier and more effective than on the general market.

The studies have concluded that the phenomenon of economy sharing in relationships between enterprises is still not quite common, hence the exchange of information on resources is not the basic custom of most companies. Although companies have unused resources that temporarily generate additional costs, they are not willing to inform and transfer their resources to other companies. At the same time, it has been shown that the process of exchanging information about resources is the most possible and real in companies belonging to one industry. Such an exchange is primarily aimed at increasing the efficiency of own company's operations, which is facilitated by the temporary provision of free resources to the partners. This is even more justified because the flow of information takes place in a trusted circle of business partners and is easier.

The results obtained show that an important factor determining the flow of information on temporarily free resources is trust. Therefore, in subsequent studies, it is planned to examine the role of trust in the process of exchanging information and property resources between entrepreneurs.

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