

OPERATIONALIZATION OF ABSORPTIVE CAPACITY

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Abstract

Background. Absorptive capacity is defined as the ability of a firm to recognize the value of new external information, assimilate it, and apply it to commercial ends. It is regarded as an important factor in both corporate innovation and general competitive advantage. Absorptive capacity explains how firms can create and capture value from in-sourcing external knowledge.

Research aims. The systematic literature review has indicated some discrepancies in the field of absorptive capacity operationalization of its dimensions.

Methods. The article summarizes both theoretical and empirical literature on absorptive capacity. Moreover, based on that literature some proposals for the operationalization of absorptive capacity were formulated.

Key findings. One of the interesting and quite new research areas within these processes is the absorptive capacity, and, to be more precise, the dimension of absorptive capacity. Generally speaking, absorptive capacity literature focused on the capacity to make use of existing knowledge, placing emphasis on the capacity to assimilate and transform it and the necessity for a firm to accept external knowledge as a legitimate resource for innovation. It is one of the fundamental learning abilities that organizations can develop to detect knowledge and information outside the organization that may be useful to them and then to internalize and adapt that information to their specific needs and exploit it for market goals. However, despite its positive impact on growth, quality and content of knowledge, the absorptive capacity has not been investigated in a holistic way so far. The article summarizes both theoretical and empirical literature on absorptive capacity. Moreover, based on that literature some proposals for the operationalization of absorptive capacity were formulated.

Keywords: Absorptive, Absorptive capacity, Knowledge, Knowledge management

INTRODUCTION

Absorptive capacity is not a new notion. The processes of learning have been located in the centre of scientific and managerial attention for almost two decades now. Innovation or protection of intellectual rights also constitute significant challenges for the economic policy on the global competition scene. These problems cannot be narrowed down to the processes that take place inside an organization. The increasing interdependence of enterprises improves significant of a number of phenomena, which have not been fully identified yet. The absorptive capacity reflects the organization's potential towards recognition, acquisition, internalization and exploitation of knowledge coming from external sources. In this sense, it is complementary towards the ability of independent learning by the organization (Czakov, 2008). The absorptive

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capacity of knowledge supports organizational learning and innovation. Before analysing the literature, and developing the research procedure such a postulate had been accepted.

Previous studies over the absorptive capacity were performed from the evolution theory perspective (Nelson & Winter, 1982), innovations management (Hefalt, 1997), knowledge management (Lane, Lubatkin, 1998), strategic management (Rokita, 2007, 2009; Van den Bosch *et al.*, 1999). It has been the subject of an elevated interest from the side of scholars for more than 20 years. This situation has taken place since the paper on absorptive capacity of knowledge was published in 1990 by Cohen and Levinthal. The authors were the first ones to examine the absorptive capacity of knowledge in the organizational context.

The absorptive capacity is a field of research that still demands inquiries, exploration – which is first of all connected with identification of component processes of absorptive knowledge. Discrepancies among the scholars are visible on the operationalization of separate component processes of the organization's absorptive capacity. Literature describes no attempts of direct empirical measurements of dimensions and determinants of the organizational absorptive capacity. The current state of knowledge requires to specify and clarify this notion. There is neither common definition nor the number of dimensions worked out, and the research results are differentiated. Regarding a high level of ambiguity of definitions, heterogeneity of attitudes, defects of previous approaches to measurement of absorptive capacity – the article aims at presentation of main assumption of the previous cases of operationalization of the absorptive capacity. The article has been divided into two parts. The first one covers a synthetic characteristic of the absorptive capacity, together with its description of significance for contemporary organizations. Second part is devoted to the notions of operationalization of the absorptive capacity.

REVIEW

The Definition of Absorptive Capacity

In a colloquial sense, the capacity is referred to as the potential for acting “regardless its praxeological characteristics, i.e. the level of efficiency” (Czakoń, 2008). Definitions of capacity take into account the meaning of knowledge, its transfer, organizational learning, interactions and changes in the environment. The capacity also means routine of a higher order, which “together with information inputs provides the organization's managers with particular decisive option, to create results of a given type” (Winter, 2000). An organization with a capacity can achieve particular aims, thanks to gathered skills and resources, which distinguishes it from the competition (table 1).



Table 1. Features that distinguish capacity

Author/ authors	Characteristics of capacity
S. Raj, K. Ramakrishnan	creation and exchange of knowledge creation of internal structures and processes adaptation of the business to the changing needs
J. Rokita	obtaining resources from the environment know-how in the matter the ability to use this knowledge in practice
W. Czakon	a conscious and purposeful action achievement of a particular aim matching the ability to act to a particular context concentration on internal processes and systems
C. Jones	creation of components that distinguish the organization employees' abilities directed at achievement of organizational aims and strategies
D.J. Teece, G. Pisano, A. Shuen	maintenance of pensions making decisions efficiently

Source: own work.

The matter of absorptive capacity has been a subject of research for more than 20 years. Cohen and Levinthal (1989, p. 569) were the first ones to notice that the absorptive capacity is an organization's ability to identify, assimilate and use the knowledge, which is present in the organization's surroundings. The authors claimed that this knowledge may be used by the organization for economic purposes. The absorptive capacity is also a recognition of value of external knowledge, and an ability to develop a set of organizational procedures and processes, thanks to which the organization may acquire, adopt, process and use the knowledge in order to obtain dynamic organizational abilities (Zahra & George, 2002).

It needs to be emphasized that despite many attempts to determine what the absorptive capacity really is, there is no an unambiguous and clearly stated definition of this notion. Lack of cohesion can be noticed, connected with a wide variability of theoretical basis. Most of the definitions refer to Cohen's and Levinthal's research. The absorptive capacity is not a sum of absorptive capacities of all members of an organization, but the level of the organization's absorbance depends on the absorptive capacity of its separate members (Cohen & Levinthal, 1990). The absorptive capacity is not an aim in itself for an organization, it is rather a side product. Absorption of new knowledge from the outside and implementing it into the organization is a complex process, which takes place in a continuous manner on different levels of the organization at the same time. It is also significant that an organization, which has an absorptive potential knows the value of its internal knowledge (Cohen & Levinthal, 1990). It is also true in case of silent knowledge, which is transferred through direct interactions of the organization's members (Jones & Craven,



2001). This is why, a procedure of spreading new knowledge is so important in the matter of absorptive ability (Lane & Lubatkin, 1998).

A basic sign of an absorptive capacity is an ability to accept the external knowledge, use it to create innovative solutions and to imitate other organizations. The absorptive capacity helps an organization to learn and make scientific and technological discoveries outside the organization (Deeds, 2001). It also allows to obtain knowledge and use it effectively in order to increase an ability for innovations, adapt to changes in the surroundings and be competitive (Daghfous, 2004). Absorptive capacity is one of the learning abilities, which make it able to identify knowledge and information being outside the organization, their assimilation, internalization and use for market purposes.

Organizational absorptive capacity supports organizational learning, scientific and technological discoveries outside the organization (Deeds, 2001). It allows the organization to obtain knowledge and apply it effectively for the purpose of increasing the ability of innovations, to adapt to changes in the environment and to remain competitive (Daghfous, 2004). Rokita believes that absorption of knowledge from the environment is the source of “creation of new values only when it is applied competently, i.e. transferred from knowledge resources that create the competitive potential of the organization and into the knowledge resource, applied on the strategic (new perspectives) and operational (new possibilities of application) levels” (Rokita, 2009). Therefore, the absorptive capacity of knowledge is one of the ability to learn, which enables identification of knowledge and information, which is located outside the organization, its assimilation, internalization and exploitation for market purposes. It depends e.g. on the level of base knowledge (Jiménez-Barrionuevo, García-Morales, & Molina, 2011).

The Present State of Research

To determine research spheres that were weakly represented in previous research, together with a catalogue of potential research problems, a systematic literature review was conducted (Czakoń 2011). Performance of such an analysis will allow to become certain about the strictness, effectiveness, clearance and quality of identification of the research subject in projects. Therefore, it is significant to specify and develop some criteria. It needs to be emphasized that few authors performed a systematic literature review in the scope of absorptive capacity. Methodology of systematic literature review covered several stages:

1. specification of the research aim,
2. selection of basic literature,
3. selection of publications,
4. development of a database of publications,



5. bibliometric analysis,
6. analysis of contents and
7. development of the report.

Determination of the collection of publications which will pose a subject of analysis and research required selection of the basis database, key words, inclusions and exclusions. The analysis was applied in case of full-text databases Google Scholar, ProQuest, EBSCO, Web of Science, EBSCO, Scopus, Proquest, Web of Science, Emerald, Elsevier/Springer. As a result, 20 000 publications were obtained. According to the methodology of systematic literature review, some limitations were imposed. The area of interest excluded publications of medical, IT and technical nature, together with those grasping the relational capital in a macroeconomic context. Moreover, some limiting values were imposed: the area of social sciences, publications available in a full versions, reviewed publications, publications in scientific magazines. After the first selection, which took full-text databases into account, key words and abstracts were taken into account. Afterwards, the obtained collection of publications underwent "database cleaning" (Czakov, 2011). A database, which will pose a subject of further analysis, was obtained: with a joint number of 85 units. Selection of the research subject was performed thanks to application of key words, full-text databases, reviewed publications and abstracts (table 2).

Table 2. The process of the literature base building

Searching criteria and constraints	Google Scholar	ProQuest	EBSCO	Web of Science	Emerald	Elsevier/Springer
Joint number of scientific publications with absorptive capacity	339 000	4618	8471	77	1075	7148
absorptive capacity title, abstract	1 660	314	760	-	49	304
absorptive capacity keyword	-	53	231	-	5	121
Full-text reviewed publications	50	20	49	15	10	98
Total*	242					
After verification of abstracts, titles and the research area	85					

* Publications in the full-text databases can duplicate. 242 publications in total were qualified absorptive capacity. Review status for: November 2012.

Sources: own work.



After the first selection, which took into account the full text databases, another stage comprised using keywords and abstracts – the obtained collection of publications underwent “a database cleaning”. Publications of medical, IT and polytechnic character as well as those describing the absorptive capacity in the context of macroeconomics were excluded from the field of interest. 85 publications chosen on the basis of a three-stage selection of a research’s subject were analysed. In case of 26 of them, keywords were not taken into consideration.

Adequate research methods underwent an analysis of presence frequency and identification of dominating categories. Research over the absorptive capacity are conducted from different perspectives. However, it can be pointed to those used most often. Perspectives that are used most often by researchers interested in the matter of absorptive capacity – organizational learning, competences and innovations – were differentiated. More than 41% of the researched publications accepts the perspective of innovation, and 29% refers to the organization learning.

After selecting and segmenting the research in the explored publications, research problems that are met most often were distinguished: investments in R&D (22%), endo- and exogenous potential sources of knowledge (22%), transfer of knowledge (14%), relations and cooperation among organizations (9%), determinants for the absorptive capacity of knowledge (9%), measurement of the absorptive capacity (6%), dimensions of the absorptive capacity of knowledge (6%), testing an analytical and a proceeding model of absorptive capacity (6%), redefining the absorptive capacity of knowledge (2%), organizational routines (3%), relative absorptive capacity (1%).

A differentiated subject of research may be pointed out in the analysed publications. They are focused on small and medium enterprises (Indarti, 2010), heavy industry (Schmidt, 2005), chemical business, car and sub-assemblies factories, (Jiménez-Barrionuevo, García-Morales, Molina, 2011), high-tech (Schmidt, 2009).

The performed systematic literature review, including analysis of content, allowed identification of cognitive gaps and determination of directions for further research. It was found out that the absorptive capacity is a relatively new sphere of interest in the theory of management and theory of organization. Analysis of the publication number allowed to determine maturity of the research field. Interest of scientific research centres in the relational capital has been significantly changed over the course of time. The process of statistical concluding performed on the sample of 85 scientific publications confirms that interest in absorptive capacity started in 1989. From that time, the number of publications on various research fields exploring relational capital has been growing. However, only in 2007, was the growth in publication observed. It is also



hard to determine the interest in problems of relational capital as spectacular (figure 1).

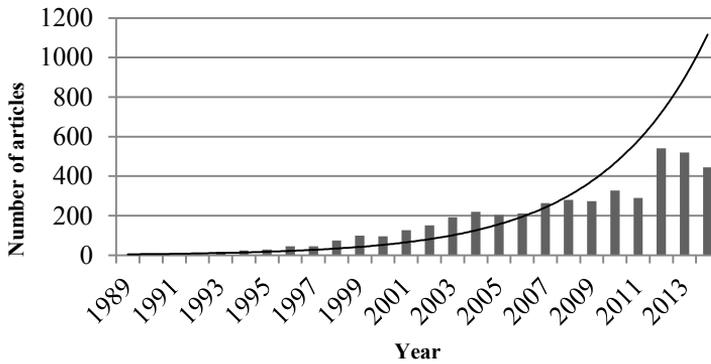


Figure 1. Number of publications in the scientific journals

Source: own work, based on results of systematic literature review.

From the perspective of scientific research, the topic of absorptive capacity building attracts moderate but growing attention of scholars. According to the analysis of an increase in the number of publications, a growing trend can be observed. Therefore, it may be concluded that absorptive capacity is still a relatively young notion. Hence, searching for shaping factors may be perceived as a current research challenge, especially as it turns out to be highly useful in supporting interactions with internal partners.

On the basis of analysis of the research that has been conducted, it may be concluded that they were concentrated on determination of its meaning for an organization, while not much attention was devoted to the processes that create the absorptive capacity. Divergences among different researchers are visible as well on the level of conceptualization and operationalization of the absorptive capacity. Literature of the subject also does not provide an unambiguous answer for the question about cause and effect relations of separate factors with the dimensions of absorptive capacity. What is more, there is a lack of empirical research conducted in organizations serving the social environment – the non-profit ones.

Operationalization of Absorptive Capacity

Operationalization of dependable variables allows to choose a technique of measurement. In case of operationalization of the organizational absorptive capacity it is tough, since the previous studies over the organizational absorptive capacity were only partial, based on one, most commonly cited measurement (Table 3). Only 19 out of 85 analysed



authors made an attempt to operationalize the absorptive capacity, within the systematic literature review.

The absorptive capacity is not a homogeneous notion. Literature review provides a number of component processes, which condition the absorptive capacity. A list and names of the component processes of the absorptive capacity, were separated on the basis of literature review. The most commonly raised are: identification, assimilation, internalization and exploitation of new knowledge.

Table 3. Operationalization of Absorptive Capacity

The component process	Operationalization
Identification	<p>the amount and frequency of exchange of information and experiences with companies from the same branch</p> <p>the amount and frequency of participation in research projects, together with other organization from outside the branch</p> <p>the amount and frequency of meeting with external experts operating within the branch</p> <p>an innovative system that encourages to apply the knowledge obtained from the environment.</p>
Assimilation	<p>the amount and frequency of passing on the knowledge acquired externally, among employees</p> <p>access to Intranet, reports that codify the acquired knowledge</p> <p>frequency of meeting of the employees, devoted to the exchange of the acquired knowledge</p> <p>jargon as a manner of communication</p>
Internationalization	<p>participation of the employees in the continuing education</p> <p>the frequency of applying the acquired knowledge in the organizational operation</p> <p>combining the existing knowledge with the knowledge obtained from external sources</p> <p>modification of the theoretical knowledge into the practical one</p> <p>the amount and frequency of launching innovative services on the market</p>
Application	<p>the number of prizes in contests</p> <p>the number of competition winners among the students</p> <p>possession of quality certificates</p> <p>the number of publications in branch magazines</p> <p>employees' participation of the employees in theme conferences</p> <p>the number of book publications by employees of the facility</p> <p>the number of organized conferences</p>

Sources: own work.

A variety of approaches towards operationalization and indicators of component processes of the absorptive capacity are observed. This fact arises from the differentiated scope, character and the field of actions of the researched organizations. Most often, the absorptive capacity is measured with a number of patents, the number of scientists employed full-time, research and development activities, the number of publications



and implemented new projects. However, not every organization has a R+D department, and the costs devoted to the research work are difficult to estimate. These measurements are fragmentary, and they do not fully reflect the dynamic possibilities of the absorptive capacity of knowledge, and the processes of the knowledge flow (Zahra & George, 2002). Literature of the subject specifies the difficulty of direct measurement of the absorptive capacity of knowledge. It is also hard to measure the absorptive level of the organization. It constituted a difficulty in the attempt to reflect the category of the absorptive capacity in the set of definitions, principles and rules. Comparability of the empirical studies is limited as well. Cohen and Levinthal believe that it is hard to compare results of empirical studies - it is impossible because of the organization's specificity (Cohen & Levinthal, 1990). Research over the nature of absorptive capacity of knowledge, and features that limit it, is not only non-materiality of the absorptive capacity of knowledge, but also various terminology applied in reference to the dimensions. The performed analysis of contents within the scope of systematic literature review allows to select cognitive gaps, which are presented by authors of publications. It was found out that one of the reasons of discrepancies and lack of consensus of scientific environments is the non-material character of absorptive capacity, measurement difficulty and differentiation in recognition of the meaning scope in various context and condition of the organization's activity. The above mentioned conclusions bring consequences for further research. They point to a research gap, which further constitutes a premise for carrying on with studies related to conditionings of absorptive capacity, they determine the need to explain variety, which leads to improvement and efficacy and efficiency of an organization. This will also limit the possibility of standardization and assumption of a universal approach. These conditionings causes that the conceptual basis was simplified, and analysis of factors of the absorptive capacity was narrowed down not only to R+D departments. An intention here is to get familiar with the nature of absorptive capacity of knowledge and its conditionings, as well as identification of dimensions of the absorptive capacity of knowledge. Analysis of the previous studies of the absorptive capacity allows to form the following conclusions:

1. There is no agreement as to the components, and to an explicit answer for the cause and effect relationships between separate components of the organizational absorptive capacity. What is more, the literature describes no attempts of direct empirical measurements factors that influence the absorptive capacity of the organization. Hence, it is impossible to compare the results of research in the factors that develop the absorptive capacity of the organization (Lane et al., 2002) Furthermore, it may be noticed that



determinants of the absorptive capacity were researched only fragmentarily (Lane et al., 2002). The reason for such a state of affairs is believed to lay in the fact that the organizational absorptive capacity poses a notion that is hard to operationalize (Lane et al., 2002).

2. in empirical studies, dimensions of the absorptive capacity are grasped separately, there was no operationalization performed simultaneously for four dimensions. However, theoreticians suggests that the four dimensions of the absorptive capacity of knowledge need to be treated as “interconnected blocks” (Lane et al., 2006).

Taking into consideration the above mentioned statements, it was assumed that the absorptive capacity of knowledge should constitute an action that is planned and localized in the organizational strategy, and these actions ought to be focused on development of knowledge resources, determination of their new directions and scopes of applying them. What is more, attention was drawn to the fact that the absorptive capacity of knowledge increases its values on consideration of the vision of knowledge and complementation of its gaps.

DISCUSSION

The absorptive capacity reflects the organization's potential towards recognition, acquisition, internalization and exploitation of knowledge coming from external sources. A crucial role in developing the absorptive capacity is played by knowledge. The new knowledge supports improvement of decisive processes and relationships among people in the organization, along with their relations with the environment. Thanks to knowledge, the organization acquires the ability to solve problems and survive in conditions of uncertainty. A foundation, where permanent competitive advantage and the organizational ability to learn grows, is posed by knowledge. Absorption of new knowledge from the environment poses a source for establishment of new values. They are transferred from the knowledge resources, which create the competitive potential of an organization, into the resource of knowledge applied on the strategic and operational level.

In the light of research, the absorptive capacity is a process focused on development of knowledge resources and determination of new directions and scopes of its application. This capacity depends on the level of knowledge held by an organization, and it is strictly connected with managerial structures and relationships among the employees. What is significant is that the absorptive capacity increases its value on consideration of the vision of knowledge and complementation of its gaps.



Therefore, it is crucial to know the instruments for measuring the knowledge held by the organization.

The absorptive capacity of knowledge is a field of research that still demands inquiries, exploration - which is first of all connected with identification of component processes of absorptive knowledge. Discrepancies among the scholars are visible on the operationalization of separate dimensions of the organization's absorptive capacity. Literature describes no attempts of direct empirical measurement of component processes of the organizational absorptive capacity. The current state of knowledge requires to specify and clarify this notion. There is neither common definition nor the number of dimensions worked out, and the research results are differentiated. The majority of the studies refer to results obtained by W.M. Cohen and D.A. Levinthal. Some research from the scope of absorptive ability, ignored the experience of its predecessors (Lane et al., 2006).

CONCLUSIONS

The absorptive capacity is still an area of research, which needs further exploration. Despite the fact that it is an important aspect of an organization development, so far it is relatively weakly described and researched. There is a large deficit in empirical studies related to identification of factors that shape absorptive capacity in the education sector. A methodology gap identified during the systematic literature review, proven in lack of homogeneous tools for shaping the absorptive capacity in the sector of education. As a result of a systematic review of literature, pilot and right empirical research - the following factors of absorptive capacity have been distinguished: base knowledge, worker's abilities, interactions with surroundings and educational projects.

The conducted empirical research creates a possibility for further studies on the absorptive capacity. An interesting direction of the further research is an identification of factors of the absorptive capacity other than those included in literature of the subject. It is suggested to conduct further research also in educational institutions. Here, knowledge is of great significance. However, conditions of the absorptive capacity are different from those present in the innovative and specialized organizations. It is proved by the fact that the base knowledge is a factor of little significance. Therefore, the absorptive capacity and its conditions are both fields that were still not researched. The necessity to pay attention to this area comes from a belief that the absorptive capacity causes innovation and organization learning.



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OPERACJONALIZACJA ZDOLNOŚCI ABSORPCYJNEJ

Abstrakt

Tło badań. Zdolność absorpcyjna definiowana jest jako identyfikowanie, asymilowanie i wykorzystywanie wiedzy do celów komercyjnych. Jest uważana za ważny czynnik innowacyjności oraz budowania przewagi konkurencyjnej organizacji. Zdolność absorpcyjna umożliwia także wykorzystywać wartości z pozyskanej wiedzy z otoczenia.



Cele badań. Systematyczny przegląd literatury wykazuje rozbieżności w zakresie operacjonalizacji procesów składowych zdolności absorpcyjnej.

Metodyka. Artykuł prezentuje rozważania teoretyczne i empiryczne zawarte w literaturze dotyczącej zdolności absorpcyjnej. Na podstawie tej literatury przedstawiono propozycje operacjonalizacji zdolności absorpcyjnej.

Kluczowe wnioski: Ogólnie rzecz biorąc, zdolność absorpcyjna koncentruje się na potencjale do wykorzystania pozyskanej wiedzy, kładzie nacisk na asymilacji i internalizacji wiedzy oraz konieczności przyjęcia wiedzy zewnętrznej jako źródła innowacji. Jest to jedna z podstawowych umiejętności uczenia się. Jednak pomimo pozytywnego wpływu na wzrost, jakość i treść wiedzy, zdolność absorpcyjna nadal nie została przebadana w sposób holistyczny. Jednym z ciekawych i dość nowych obszarów badawczych jest operacjonalizacja zdolności absorpcyjna, a dokładniej jej procesów składowych.

Słowa kluczowe: absorpcja, zdolność absorpcyjna, wiedza, zarządzanie wiedzą

