

19th International Conference Enterprise and Competitive Environment 2016, ECE 2016, 10–11
March 2016, Brno, Czech Republic

Relational capital and open innovation – in search of interdependencies

Regina Lenart-Gansiniec^{a,*}

^a*Jagiellonian University, Department of Management of Public and Civic Organizations, Institute of Public Affairs,
ul. Prof. S. Łojasiewicza 4, 30-348 Krakow, Poland*

Abstract

The article raises the matter of open innovation significance, with special stress put in the crowdsourcing concept in the context of relational capital. It is claimed that effective operation of an organization is decided by the ability of development and maintenance of relationships with the environment. It is expressed by various relationships, interdependencies and mutual influences exerted by entities. This becomes a basis for the relational capital, which arises from potential collected and generated from cooperation and resources of all involved parties. Creation and development of relational capital is considerably brought down to creation of conditions, which would enable to initiate, shape, develop and maintain relationships between members of a given organization, and between the organization and subjects from its surrounding. It is not present independently, but in relation to human (capital of managers, employees) and structural capital, as a component of the intellectual capital. The relational capital emerges as a result of well-thought actions - it depends on strategic decisions and organized actions. Literature of the subject shows on one hand that the relationships contribute to creation of innovations, but on the other they also support development of relational capital. Purpose of the article is to find out the interdependencies between the relational capital and open innovation. The starting point in the undertaken deliberations is a statement that emergence of relational capital should be initiated with proper actions. The performed literature review allowed not only to present more details about the previous works, but also to demonstrate the significance of actions related with open innovations in the context of the relational capital development.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of ECE 2016

Keywords: open innovation; relational capital; crowdsourcing

* Corresponding author. Tel.: + 48 604 35 88 77.

E-mail address: regina.lenart-gansiniec@uj.edu.pl

1. Introduction

Literature of the subject suggests that a determinant of effective operation of an organization, of adaptation abilities is the skill of developing and maintaining relationships with various entities (Gulati, 1998). These relationships exert certain influence on existence and the level of organizational development (Edvinsson, Malone, 2001), they contribute to achievement of benefits by each party and generation of a relational rent (Stańczyk-Hugiet, 2011), competitive advantage, competitiveness, they enable access to precious, unique resources (Ford, et al., 1998). However, the relationships themselves have no value - there is a necessity for proper mechanisms and regulations, with which market transactions providing benefits to the involved entities are finalized. It requires proper outlays, actions and investments within the scope of its maintenance, strengthening and development. Lack of actions may result in weakening and decay of relationships, as well as a decrease in their value (Madhok, 2006).

On the basis of cooperation, external relationships, common standards of the partners, resources and potential, the relational capital is created. It emerges as a result of well-thought actions – it depends on strategic decisions and organized actions. Therefore, identification of conditions, which support implementation of the relational procedure is necessary (Alvarez, Barney, 2004). Its shape is influenced by the process of information exchange, realization of mutual expectations, certain flexibility, adaptiveness. What is significant is that the organization that is willing to create the relational capital should strive for enhancement of its adaptation skills. What is more, it is hard to improve one's abilities, win valuable resources or skills one's own. Only skillful development of connections with the surroundings will allow the organization to create advantages from development of relational capital. Then, the relational capital may pose a source for creation of value in the material and non-material dimension (Ritter, Walter, 2008).

Open innovations are increasingly more often mentioned in the context of innovations and effective manners of their development. They refer to precious ideas, which may come from the organization's environment, or are developed in the organization itself, with participation of the environment (Chesbrough, 2003). A basic feature of open innovations is cooperation and involvement of various partners, who acquire concepts and resources from outside of the organization (Chesbrough, 2003). Hence, the organizations are oriented on seeking for manners to develop their products, with special emphasis put on maximization of profits for all of the cooperating entities. It is also the matter in case of public organizations. Here, application of the citizens' wisdom for creation of ideas is observed – i.e. crowdsourcing.

Literature of the subject proposes three approaches to the relational capital and open innovation. First of all, creativity of single persons leads to innovation (Schilling, 2005), special meaning is adopted by relationships within an organization (Woodman, Sawyer, Griffin, 1993). Second of all, relational capital of the whole organization contributes to creation of innovations. It provides ideas and new solutions (Roberts, 2001). Third of all, an efficient system of communication with the environment is significant for production of relational capital (Chomiak, Orsa, 2013).

Purpose of the article is to find out the dependencies between the relational capital and open innovation. The starting point in the undertaken deliberations is a statement that emergence of relational capital should be initiated with proper actions, and relationships with the environment are indispensable for emergence of open innovation.

The article is composed of three parts. The first part refers to the notion and essence of the relational capital. This part presents theoretical deliberations connected with the relational capital issues. The notion and essence of open innovation are demonstrated in the second part. There is a discussion over the essence of the open innovation process, and their meaning for the organization. The last, third part of the article, is devoted to the search for connections between the relational capital and open innovation. They are approached from the public organizations side. The search for connection between those notions is justified by the fact that the organization that plans to shape the relational capital should strive for enhancement of connections with the environment.

2. Relational capital

In literature of the subject it is suggested that properly shaped relationships exert certain influence on existence and the level of organizational development (Edvinsson, Malone, 2001), they contribute to achievement of benefits by each party and generation of a relational rent (Stańczyk-Hugiet, 2011), competitive advantage, competitiveness, they

enable access to precious, unique resources (Ford et al., 1998). It means that cooperation allows the companies to reduce the operational costs actively, share the risk, acquire unique knowledge, obtain access to markets and transfer of technologies. It is assumed that relationships are defined as order influence, which includes relatively permanent transactions, flow of resources and other contacts emerging between two or more organizations and between a given organization(s) and its surrounding.

The relationships are a binder that join complementary resources held by market partner, at the same time strengthening their competitiveness and innovation. Therefore, it may be concluded that a relationship is a specific resource generated on the basis of held knowledge, and variables such as time, realization, development or satisfaction decide about its specific character.

Foundations of emerging relationships are constituted by their participants' belief in limitation of their own possibilities, and the awareness that some processes may be performed more effectively with application of external sources. Hence, operation of companies is focused on creation of various configurations of organizational units (partners). Participants of such configurations subject their actions to achievement of a common objective, and they present willingness to cooperate for the time of realization of the specific undertaking. The participants are the entities that decide to undertake common actions within a given area, directed at realization of common aims, which are determined by the intentions for establishment of cooperation. A results of the decision on establishment of cooperation is involvement of resources to the benefit of aims realization, as well as undertaking specific actions (Kale, Singh, Perlmutter, 2000; Uzzi, Lancaster, 2003).

The relationships form relational capital. Despite numerous attempts to determine what the relational capital is, there is no an unambiguous and clearly specified definition of this notion. Literature of the subject assumes that it is a component of the intellectual capital. The relation capital refers to relational resources emerging from the potential gathered within an organization. Relational resources are characterized with the fact that they are present on the edge between an enterprise and the surrounding, and their essence is the ability to establish and use the relationships on the basis of cooperation between the entities. Therefore, the relational capital poses a result of the ability to create and build permanent relations. A condition is mutual trust, openness, transparency, social bonds and common values of the entities.

The relational capital is not present independently, but in relation to human (capital of managers, employees) and structural capital, as a component of the intellectual capital. The relational capital emerges as a result of well-thought actions - it depends on strategic decisions and organized actions. Creation and development of relational capital is considerably brought down to creation of conditions, which would enable to initiate, shape, develop and maintain relationships between members of a given organization, and between the organization and subjects from its surrounding.

The relational capital depends on external and internal factors. Its sources are exo- and endogenic relational resources, as well as other placed outside and inside an organization. Furthermore, the relational capital is influenced by external and internal conditions. Within the scope of external conditions, significance is ascribed to the business model, held resources and transactional costs. The process of relational capital development adopts formal and informal contacts between employees and the interested parties, as well as factors existing within the organizational environment. Through proper expenditures on development of the external and internal relationships networks there is a possibility to access adequate resources that support shaping of the commonality of interests.

Summing up the above deliberations, it may be noticed that the relational capital often refers to the relational resources, which emerge from the potential gathered in the organization in the course of creation and development of permanent relationships by the organization, based on relational standards. They are defined as a series of partially overlapping and cohesive principles of conduct (Heide, John, 1992). The subjective character of relational forms is emphasized here, because they refer to principles, regulation, prohibitions, guidelines, instructions and rules of conducts within the scope of exchange and expectations expressed by both parties of the relationship. These are also mechanisms of management and business relations, establishment of cooperation, fulfillment of common needs, early identification of those needs and development of relationships (Macneil, 1981). Therefore, the relational capital is not only the ability to create and maintain relationships based on standards, but also a resource related to human relationships. Therefore, abilities of an organization to shape the relationships with the environment skilfully are

significant. This may lead to creation on innovation (Roberts, 2001) and emergence of the ability to establish contacts and access to innovative ideas (Chesbrough, 2006).

3. Open innovation

Open innovation is defined in literature of the subject as organization's openness to exploitation of ideas coming both from the inside and from the surroundings (Chesbrough, 2006). Other definitions suggest exploitation of ideas emerging both inside and outside a company, as well as internal and external manners of launching a new product, i.e. a new technology on a market. (Matusiak, 2008). Therefore, within the process of searching, discovering and developing innovations the organizations lean not only on their own ideas, but also on concepts remaining within their environment. The concepts flow to the organization from the surroundings, and are afterwards included in the development process of innovation, or shared with others (Seltzer, Mahmoudi, 2013). They also share with knowledge they hold, in a form of licenses or sales of patents. Hence, the organizations are oriented on seeking for manners to develop their products, with special emphasis put on maximization of profits for all of the cooperating entities. Thanks to cooperation with the broadly comprehended partners, the organization is able to transform the business, from focus on the production towards the organization that serves the environment.

Open innovation is based on cooperation. According to that approach, organizations cooperate with external partners within the scope of creation and production of new concepts. Therefore, resources of the organization and cooperating partner are integrated. Hence, a basis of open innovation is posed by integration of ideas by the broadly understood interested parties with the innovation process. A condition for realization of the open innovation is concentrated on voluntary interactions, i.e. not an automatic integration of partners. It means creation of innovation with consideration of knowledge and abilities of the surroundings, through cooperation, openness, sharing, honesty and dependence. Therefore, the organization strives not only to seek for new concepts and ideas, but also solutions, which exert real influence on the organizational development.

Measurable benefits brought to an organization by application of open innovation comprise of, among others: access to a wide specter of ideas and a broader selection of innovators, as well as a possibility to reach the best ideas and solution, enhancement and improvement of B+R efficiency, transfer of knowledge, people, technologies, access to knowledge resources, establishment of cooperation and its strengthening with the citizens, development of solutions to social challenges. Apart from possibilities of access to knowledge, costs of technology and other new solutions may be decreased, at the same time the possibility to derive profits from frozen assets, e.g. in a form of patents.

4. Relational capital and open innovation

As demonstrated in the article, a basis for emergence of relational capital is the ability to establish and maintain relationships with the interested parties. These relationships are based on cooperation and mutual trust. What is more, apart from cooperation, these actions allow exchange of material and non-material goods with the environment. Therefore, significant here are the relationships, the ability of cooperation or resources sharing. When it comes to the development process of open innovation, a significant role is played by external partners of the organization. Therefore, the organization is open to new material and non-material resources remaining within its environment. Especially the non-material resources are assets, which are identified within competences and internal procedures of an organization. Therefore, an organization has access to unique knowledge that is hard to imitate. It is assumed that these resources play a key role in construction of the organization's competitive advantage. Therefore, cooperation with the broadly understood interested parties become a basis for creation of unique non-material values. Hence, the above deliberations become a starting point for identification of an interdependence between the relational capital and open innovation.

First of all, the relational capital is called social capital in literature of the subject (McElroy, 2002). Going further, emergence of innovation is connected with relationships, bonds, norm, values, attitudes and beliefs. Relational norms pose proper behavior, standards, cooperation principles (Hughes, Perrons 2011) of both parties of the relationship. They show the manner of behavior of the parties, development of cooperation, trust, development of relations, and further relational capital (Heide, John, 1992, pp. 32–44; Kaufmann, Dant 1992). This claim gains special importance in relation to public organizations, the basic aim of which is to fulfill the public needs and establishment of cooperation

with clients-citizens within the scope of implementation of services and products, and through improvement of the citizens'/clients' rights in providing (also generating) services and products. This trend and obligation can be observed especially in educational institutions. They begin to find themselves under stress to change and adjust to the requirements and conditions of the environment. It is connected with a particular social context and trust.

A specific level of social trusts causes that the society is much more prone to adapt new solutions, ideal, i.e. Technological and economic innovations. Trust results in greater flexibility of actions, it does not impose strict framework and limitations. Additionally, the social capital is called "social innovation capital". Hence, it may be concluded that the relational capital, especially the relationships, contribute to emergence of open innovation. Some authors claim that the relational capital becomes a certain trigger of actions, especially for the organization remaining start-up phase (Peña, 2002). What is more, the organization that possesses various resources has a possibility to create various innovations, but their creation requires utilization of resources – various in terms of quantity and quality. It was proved that a significant element for innovation development is acquisition of external knowledge (Darroch, McNaughton, 2002). It refers to both market-oriented companies, as well as those focused on technological development. It should also be noticed that only a few authors come to a conclusion that there is no direct connection between the relationships and innovation (Darroch, McNaughton, 2002). It does not mean that actions referring to knowledge popularization are not significant. Importance is also ascribed to activity connected with acquisition of knowledge from the environment, and the ability to respond to the ideas flowing from the surroundings. Stress is put on the necessity to integrate the open innovation with innovative organizational strategies. Moreover, relationships established by the organizational members contribute to absorption of new concepts (Narvekar, Jain, 2006). Therefore, relational capital, but also proper organizational strategy, influence the innovative activity. The process of knowledge sharing with the interested parties poses a basis source of knowledge and access to technological, managerial and financial novelties (Dyer, Singh, 1998). Therefore, it may be concluded that the relational mechanisms pose a starting point for knowledge sharing, which supports innovation development (Huang, Liu, 2005). The notion of prosumerism appears here. The clients may participate in creation of new products or services, therefore organizational or marketing innovations. These may be universities, research organizations, laboratories, incubators and technological parks for public organizations. These organizations offer knowledge in the scope e.g. Territorial development, transfer of technology (Colombo, Delmastro, 2001).

Second of all, the notion of open innovation is connected with such notions as: citizens' participation and involvement. The OECD report suggests that "stronger relationships between the government and the citizens encourage the citizens to devote their time and effort to public issues. Better public policy exploits the citizens' contribution, which is perceived as a valuable resource. Information, consultations and active participation provide the government with a better foundation for creation of policies, allowing the citizens to acquire knowledge. At the same time, such an approach provides more effective implementation of policy, because the citizens are well-informed about the political actions of the government, and they participate in their development" (Gramberger, 2001). Actions that encourage the citizens to participate are focused around six goals: (1) information and education, (2) flow of information, (3) providing the citizens with a possibility to shape public policy, (4) legitimization of governmental decisions, (5) improvement of public life quality through development of trust and involvement of the citizens, (6) involvement of the citizens in monitoring over the results of actions of the public policy. Contemporary studies devoted to innovations suggest that the clients are authors of innovative solutions within numerous grounds (Von Hippel, 2007). When it comes to acquisition of those solutions, the organization may use new technologies, including crowdsourcing. Its purpose is acquisition of competences and experiences of a virtual community. In practice, it embraces various methods, from solving simple tasks, to complex problems connected with significant innovations, which are to be solved by a selected group of individuals.

The notion of crowdsourcing was coined by J. Howe, specifying it as entrusting an unidentified broad group of persons with realization of tasks – in a form of an "open invitation" - traditionally performed by specialized entities within the scope of a particular organizational structure (Howe, 2006). Crowdsourcing is the process of creation of certain ideas, and afterwards involvement of society into creative realization of the concept, but also provision of possibilities of cooperation in its production (Brabham, 2008). A citizen is not only a passive recipient of information anymore. They can shape the public opinion, they are providers of ideas and ready solutions (Howe, 2006). This

process is realized on Internet platforms, which enable gathering of innovative ideas of virtual societies (Sawhney et al. 2005).

Internal conditions of innovative operation are connected, among others, with creation of relationships. The crowdsourcing concept is based on a dialog with the surrounding carried out by the organization. It somehow invites the virtual communities to creation of new ideas, but it also established virtual relations. This means that crowdsourcing may ensure a proper level of depth of the relationships. Success of crowdsourcing is decided, among others, by: acquisition of innovation possible for utilization, and internal competences of organizational employees for performance of cooperation (Alonso, Rose, Stewart, 2008; Ebersberger, Herstad, Iversen et al., 2011). In relationships establishment, especially significant are abilities and competences, especially those relational ones, with application of knowledge, skills, abilities and attitudes in the sphere of cooperation (Nahapiet, Ghoshal, 1998).

5. Discussion and propositions

A starting point for this article was a conclusion that efficient communication system with the environment is significant for effective establishment of the relational capital, while the relationships pose a foundation for innovation. The article discusses the notion and essence of relational capital, open innovations, with consideration of crowdsourcing. Several conclusions may be drawn on the basis of literature analysis:

1. A subject of open innovation is posed by relationships established by an organization with its environment. The relationships are established with the broadly understood interested parties, what is a basis for creation of unique non-material values.
2. In literature oft he subject in the field of strategic management, the relation capital refers to relational resources emerging from the potential gathered within an organization. What is significant, in order to improve innovation, the necessity to build the relational capital is stressed (Lorenzoni, Lipparini, 1999; Darroch, McNaughton, 2002). It is indisputable that the relational capital is significant for creation of open innovation, especially in the context of public organizations.
3. Within the course of searching for interdependencies between the relational capital and open innovations, it was found out that communication with the environment is significant for establishment of the relational capital. It may be assumed that open innovation, especially crowdsourcing, determine establishment of relationships. While only proper interorganizational actions allow development of the relational capital. Possibilities brought by open innovations may facilitate and enable access to information, knowledge and new relationships.
4. Open innovations employ computer technologies and IT platforms, which pose not only a place for exchange of concepts, but also a communication tool between the citizens, officers and representatives of public institutions. And they may pose a basis for creation of the relational capital in the context of relationships.
5. The search for connections between the relational capital and open innovation still belongs to the relatively new areas, and there are still no answers for numerous questions, what especially refers to influence of technologies from the scope of crowdsourcing on creation of interorganizational relationships. Therefore, a question arises, pertaining to establishment of relationships with such a kind of interested parties, i.e. the virtual society. The matter of creating the virtual relational capital of a public organization also remains unsolved. A challenge is posed by the search for answers, especially that the open social innovations contribute to fulfillment of the social requirements, identification of new ideas, innovations improving the process of public management. The relational capital is developed on satisfactions, trust and involvement of all parties in the relationships.

References

- Alonso, O., Rose, D., Stewart, B. (2008). Crowdsourcing for relevance evaluation. *ACM SIGIR Forum*, 42, 2.
- Alvarez, S., Barney, J. (2004). Organizing rent generation and appropriation: Toward a theory of the entrepreneurial firm. *Journal of Business Venturing*, 19, 5.
- Colombo, M., Delmastro, M. (2001). How effective are technology incubators? Evidence from Italy. *Research Policy*, 31.

- Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Boston, MA: Harvard Business Press.
- Chesbrough, H. W. (2006). *Open Business Models: How to Thrive in the New Innovation Landscape*. Boston, MA: Harvard Business School Press.
- Chomiak-Orsa, I. (2013). *Zarządzanie kapitałem relacyjnym w procesie wirtualizacji organizacji: podejście modelowe*. Wrocław: Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.
- Brabham, D. C. (2008). Crowdsourcing as a model for problem solving: An introduction and cases, Convergence. *International Journal of Research into New Media Technologies*, 14, 1.
- Darroch, J., McNaughton, R. (2002). Examining the link between knowledge management practices and types of innovation. *Journal of Intellectual Capital*, 3.
- Dyer, J. H., Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 4.
- Ebersberger, B., Herstad, S. J., Iversen, E., Som, O., Kirner, E., 2011. Open Innovation in Europe: effects, determinants and policy. PRO INNO Europe: INNO-Grips II report, Brussels: European Commission, DG Enterprise and Industry.
- Edvinsson, L., Malone, M. S. (2010). *Poznaj prawdziwą wartość swojego przedsiębiorstwa odnajdując jego ukryte korzenie*. Warsaw: PWN.
- Ford, D., Gadde, L.E., Håkansson, H., Lundgren, A., Snehota, I., Turnbull, P., Wilson, D. (Eds.) (1998). *Managing Business Relationships*. UK: John Wiley & Sons.
- Gramberger, M. (2001). *Obywatele jako partnerzy. Podręcznik OECD na temat informowania, konsultacji i udziału społeczeństwa w podejmowaniu decyzji politycznych*. Warsaw: Klon/Jawor.
- Gulati, R. (1998). Alliances and networks. *Strategic Management Journal*, 19.
- Heide, J. B., John, G. (1992). Do Norms Matter in Marketing Relationships? *Journal of Marketing*, 56, 2.
- Howe, J. (2006). The rise of crowdsourcing. *Wired Magazine*, 14.
- Huang, C. J., Liu, C. J. (2005). Exploration for the relationship between innovation, IT and performance. *Journal of Intellectual Capital*, 2.
- Hughes, M., Perrons, R. (2011). Shaping and Re-shaping Social Capital in Buyer-Supplier Relationships, *Journal of Business Research*, 64, 2.
- Kale, P., Singh, H., Perlmutter, H. (2000). Learning and protection of proprietary assets in strategic alliances: building relational capital. *Strategic Management Journal*, 21(3).
- Kaufman, P. J., Dant, R. P. (1992). The Dimensions of Commercial Exchange. *Marketing Letters*, 3:2.
- Lorenzoni, G., Lipparini, A. (1999). The leveraging of interfirm relationships as a distinctive organizational capability: a longitudinal study. *Strategic Management Journal*, 20, 4.
- Macneil, I. R. (1981). Economic Analysis of Contractual Relations: Its Shortfalls and the Need for a "Rich" Classificatory Apparatus. *Northwestern University Law Review*, 75, 6.
- Madhok, A. (2006). How much does ownership really matter? Equity and trust relations in joint venture relationship. *Journal of International Business Studies*, 37.
- Matusiak, K. B. (2008) (eds.). *Innowacje i transfer technologii - słownik pojęć*. Wyd. II zmienione, Warszawa: PARP.
- McElroy, M. (2002). Social innovation capital. *Journal of Intellectual Capital*, 1.
- Nahapiet, J., Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. *Academy of Management Review*, 23, 2.
- Narvekar, R. S., Jain, K. (2006). A new framework to understand the technological innovation process. *Journal of Intellectual Capital*, 2.
- Peña, I. (2002). Intellectual capital and business start-up success. *Journal of Intellectual Capital*, 2.
- Ritter, T., Walter A. (2008). Functions, trust, and value in business relationships, [in:] G. A. Woodside, F. Golfetto, M. Gibbert (ed.), *Creating and managing superior customer value. Advances in Business Marketing and Purchasing*, 14.
- Roberts, E. B. (2001). Benchmarking Global Strategic Management of Technology. Survey of the world's largest r&d performers reveals, among other trends, a greater reliance upon external sources of technology, *Research Technology Management*, 44.
- Sawhney, M., Verona, G., Prandelli, E. (2005). Collaborating to create: The Internet as a platform for customer engagement in product innovation. *Journal of Interactive Marketing*, 19, 4.
- Schilling, M. A. (2005). *Strategic Management of Technological Innovation*. New York: McGraw Hill.
- Seltzer, E., Mahmoudi, D. (2013). Citizen Participation, Open Innovation, and Crowdsourcing: Challenges and Opportunities for Planning. *Journal of Planning Literature*, 28, 1.
- Stańczyk-Hugiet, E. (2011). W poszukiwaniu renty... *Przegląd Organizacji*, 9.
- Uzzi, B., Lancaster, R. (2003). Relational Embeddedness and Learning: The Case of Bank Loan Managers and Their Clients, *Management Science*, 49.
- Von Hippel, E. (2007). Horizontal innovation networks-by and for users. *Industrial and corporate change*, 6, 2.
- Woodman, R. W., Sawyer, J. E., Griffin, R. W. (1993). Toward a Theory of Organizational Creativity. *The Academy of Management Review*, 18, 2.