Evaluation of co-creation perspective in networked collaboration platforms☆

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ABSTRACT

This study addresses a specific challenge of non-utilized benefits from the potential of networked structures, design, and technological solutions in collaboration platforms as a source for improving and stimulating internal and external co-creation opportunities. The organization of the collaboration between diverse set of actors in sharing knowledge and resources results in fragmented value co-creation processes of networked platforms (online communities, social networks, networks of practice, etc.). Collaboration platforms may differ in terms of users or purpose, but they all seem to share a number of common characteristics such as mass participation in online interactions, inclusion of information communication technologies (ICT) together with people in knowledge creation and aggregation, etc. The article evaluates the readiness of networked platforms to generate intended co-creation value by conducting a qualitative research on 30 collaboration platforms in Lithuania using a Social Indices calculation methodology (Skaržauskienė & Gudelytė, 2015). The study assesses the platforms with the use of three integrated indicators, namely, capacity for creativity, capacity for aggregating knowledge, and capacity for decision making. The research results provide valuable information on the trends in managing collaboration platforms, distilled best practices, and opened up opportunities for scientific reasoning to design engagement strategies.

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1. Introduction

Increased connectivity, low-cost mobile devices, and the use of social media have radically changed users' behavior everywhere and have the potential to affect the development of products and services. The shift of customer role in the value creation process inspires many authors (e.g., Baron, Patterson, & Harris, 2006; Cova & Dalli, 2008; Gummesson, Lusch, & Vargo, 2010; Prahalad & Ramaswamy, 2004a, 2004b) to analyze the meaning and nature of such processes. In a very basic sense, co-creation is the process of involvement of end-users in the development of services and products (Allen, Tanev & Bailetti, 2009). In a broader sense, co-creation relates to the growing discussion and the urge of civic participation in social and political processes (Alves, 2013; Magno & Cassia, 2015; Nambisan & Nambisan, 2013; Wise, Paton, & Gegenhuber, 2012). The concept of co-creation relates with many other existing conceptualizations such as open innovation (Chesbrough, 2006), collective intelligence (Malone, Laubacher, & Dellarocas, 2010), crowdsourcing (Howe, 2008), wisdom of crowds (Surowiecki, 2004), wikinomics (Tapscott & Williams, 2006), and

service-dominant logic (Vargo & Lusch, 2008). Exploitation of online media potential to leverage connectivity, responsiveness, creativity, and innovation and co-creation with stakeholders is common for these paradigms (Wise et al., 2012).

The new channels of communication and information flow enable innovative involvement of broader groups of people in collaborative activities in shorter amounts of time. The growing amount of literature dedicated to the discussion of co-creation frameworks, instruments, and processes (Allen, Bailetti & Tanev, 2009; Devasirvatham, 2012; Frow & Payne, 2012; Hakanen & Jaakkola, 2012; Kohler, Fueller, Matzler, & Stieger, 2011; Saarijärvi, Kannan, & Kuusela, 2013) highlights the trend. Nowadays, researchers regard co-creation as an organization-curated platform enabling participation and providing opportunities for customers and businesses to create experiences. The science community highlights the need for research methodology that combines different research approaches for studying the nature of co-creation in different contexts. As Gouillart (2012, p. 2) argues, "the problem is that this co-creation requires some a priori conceptualization of which internal and external people need to work together, what they want to do together, and what value they will create as a new community."

This study provides the first attempt to establish a theoretical framework for Co-creation Index methodology. The use of a theoretical study of the literature on co-creation and empirical analysis of collaboration platforms in Lithuania lead to the development of set of dimensions and indicators associated with preconditions for co-creation. Determination of mathematical values for index dimensions allows the analysis

and comparison of collaboration platforms. The evaluation results provide information about the limits of CI system and delimit the actions imperative to overcome these limitations.

2. Theoretical insights on co-creation in online collaboration platforms

Online platforms are ideal environments for creation to emerge due to the involvement of both people and IT in value creation. Online communities have several drawbacks (e.g. lack of direct contact) but partake the advantage of more efficient operational capabilities than those of traditional communities due to enhanced abilities of information exchange, storage, and processing. In addition, the use of social media tools allows development of new knowledge aggregation methods such as prediction markets (Bothos, Apostolou, & Mentzas, 2009) or data visualization (Chen & Hsiang, 2007). Innovative strategies (i.e., gamification, competition, collaborative work) promote engagement and subsequently bring change in behavior (Piccolo, Alani, De Liddo, & Baranauskas, 2014). This behavior, which Preece and Shneiderman (2009) define as "Technology-Mediated Social Participation," opens up possibilities for masses to achieve common goals – "goals that no single individual or organization could achieve alone" (Leimeister, 2010, p. 245) – through participation and collaboration on Web.

Collaboration platforms differ in terms of users or purpose, but they all seem to share a number of common characteristics. Online platforms tend to be more dynamic and open—differentiating them from businesses, government bodies and other institutionalized organizations. More flexible and ambiguous boundaries of online communities allow individuals to join and leave them more freely. The plasticity results in the easier recruitment of new members and constant flow of new ideas. Online platforms also have decentralized structures and distributed leadership capabilities. According to Luo, Xia, Yoshida, and Wang (2009), the collective creation emerges in communities, which have transparent self-organization. The theoretical and empirical study by Dabbish, Stuart, Tsay, and Herbsleb (2012, p. 1278) suggests that "providing transparency of actions on shared artifacts supports cooperative work" and proposes a variety of ways that transparency can support innovation, knowledge sharing, and community building. However, Morozov (2014) advocates that distribution of information should occur in full awareness of the social and cultural complexity of the institutional environment in which information accumulates.

Transparency closely relates to the problem of independence. By developing the individual cognitive processes and transmitting them to others, member efforts lead to the collective cognitive processes of the communities (Lykourentzou, Vergados, Kapetanios, & Loumos, 2011). The study by Lorenz, Rauhut, Schweitzer, and Helbing (2011) reports impaired independence of thought by social influences in crowdsourcing platforms. Face-to-face group processes in the organizations often lead to the polarization when faced with the social influences (Isenberg, 1986; Janis, 1982). External pressures such as managerial influence and intolerance to mistakes (Zhou & Fink, 2003) can also damage independent expression. According to Norvaišas et al. (2011), in order to eliminate the negative social, psychological, and other subjective impacts (subjectivity), platform managers must guarantee anonymity of participants. Prahalad and Ramaswamy (2004a) propose a theoretical framework of the building blocks necessary to facilitate a co-creation environment. The interaction between the organization and their customers happens through the four main building blocks of co-creation: dialogue, access, risk, and transparency. Collaboration platforms integrate all of these elements. The process of co-creation is the subject of extensive research efforts. Table 1 outlines initial theoretical insights of the study on preconditions for co-creation in collaboration platforms, which is the basis for the framework for Co-creation Index methodology.

3. Research methodology

During the first observational stage, the study uses a set of criteria to compile a list of collaboration platforms and selects Lithuanian communities with identified specific goal (e.g., club of experts in solving environmental problems, think-tank on Lithuanian e-health system). Selected communities also have capabilities to involve a large number of members (critical mass of contributors). The platforms geographically originate in Lithuania but they all center on a common social goal and use innovative collaboration technologies. The preconditions that Lithuania has to become a networked society (i.e., relatively high level of the infrastructure of IT, high-level user accessibility, and high-quality Internet accessibility in both cities and rural areas, and small number of inhabitants) are the reason for selection of Lithuanian online communities as a test model for exploring co-creation. In addition, the Web's growth in reach and capability set the stage for the explosive growth of online communities in Lithuania. These criteria led to the selection of 30 collaboration platforms.

Table 1
Co-creation criteria.

Criteria	Theoretical reasoning
Openness and flexibility	The criteria describes "the differences in demographic, educational and cultural backgrounds and the ways that people represent and solve problems" (Hong & Page, 2004, p. 16385). Recruited new members bring in a fresh new source of ideas and knowledge. This constant flow is beneficial for knowledge innovation inside the community (Luo et al., 2009).
Diversity of engagement forms	The criteria describes the capacity for information-processing efficiency with which groups are able to solve problems (Goyal & Akhilesh, 2007). Two groups of decision making tasks are the generation of alternative solutions (closely related to idea generation) and evaluation (Riedl, Leimeister, & Kassel, 2010). Luo et al. (2009) suggests that communities should have the capability of intelligent problem solving which refers to the capability of utilizing the stored knowledge to solve problems.
Decentralization and self-organization	The community should contain a memory system that stores information and knowledge, and is analogous to the memory system in a human brain (Luo et al., 2009). Distributed memory facilitates communication and coordination between individuals.
Independence	Independence refers to a situation when the decisions of others do not influence individuals. According to Lorenz et al. (2011), even minor social influence results in the bias and inaccuracy of crowd. Bias is the tendency of individuals and groups to make systematically errors in the decision-making situations. Malone, Laubacher, and Dellarocas (2009) suggest that bias mostly arise in the situations where the initial participants influence those who join later, or due to insufficient diversity. Norvaišas et al. (2011) suggests for community managers to guarantee anonymity of the participants in order to eliminate bias, subjectivity, and negative social or psychological impacts. Anonymity also offers some drawbacks. Losing the control and feeling free to act without any responsibility, often may drive towards a violation of others' rights (Skaržauskienė, Pitrėnaitė-Žilėnienė, & Leichteris, 2013).
Transparency	Prahalad and Ramaswamy (2004b) propose a model of co-creation (DART) with four building blocks: dialogue, access, risk, and transparency. The authors refer to the transparency as a necessary condition to create trust between organization and society. The empirical study by Dabbish et al. (2012) concludes that transparency can support innovation, knowledge sharing, and community building in a variety of ways.
Security and privacy	Introduction of technologies safeguarding user security and anonymity is crucial for the creation of active community and encouragement of diverse opinions (Skaržauskienė et al., 2015). Communication in social networks is not isolated with possibilities to share personal information within a closed circle of persons, thus at the same time the possibility for such data to become accessible for million people all over the world remains (Štitilis, 2013).

The exploratory stage of the research includes a natural experiment with no direct interference into activities of the researched online communities. The final stage includes an assessment of platforms on dimensions based on integrated indicators and formulated conclusions.

The social indices modeling methodology by Skaržauskienė and Gudelytė (2015) provides theoretical grounds for construction of dimensions and their measurement scale. The Co-creation Index of collaboration platforms includes six dimensions classified into categories based on their social content: degree of openness and flexibility, degree in diversity of engagement forms, degree of decentralization, degree of independence, degree of transparency, and degree of security. Each dimension comprises a different set of integrated indicators. The qualitative evaluation based on the analysis of numerical data, content, or technological design measures these indicators. The study ensures a uniform interpretation of the criteria among monitoring researchers by use of a standardized criterion with reference to the data collection and evaluation.

The study includes a table containing respective dimensions and indicators that characterize corresponding criteria and their measurement for each dimension to carry out the measurements. The table also includes numeric assessments and textual descriptions of the most frequent and/or prominent features of platform activities. The values of the indicators are of a qualitative nature. The study contains qualitative evaluation of indicators allowing numeric values (0; 0.5 or 1) that correspond to their quantitative weight. The procedure of keeping the property of monotonicity of function and according to the intuitive reasoning is to apply to transformation of the values of answers into a numeric scale. The following tables include the function (f) describing the procedure (See Table 2 and Table 3).

Other categorical variables transform by application of the same approach.

The study includes the transformation of the composite values after normalization into a more attractive scale by multiplication of the obtained values by, for example, 100 or 1000 to improve the user's perception. The study does not include the names of the communities to protect anonymity of communities.

4. Findings

Table 4 outlines the overview of results. The following chapter of the article provides a detailed explanation of the results. One of the indicators of the degree of openness and flexibility reflects diversity of platform participants in terms of gender, age, and nationality. The evaluation reveals that all observed subjects had no restrictions on community member's gender. However, the vast majority of the communities use Lithuanian language (i.e., a limitation of diversity of national origin). Members of certain age groups dominate some communities although allow participation with no age restrictions (age majority of the participants is between 24 and 34 years). One platform imposes a limit on professional occupation and experience of the participants.

Table 2
Conversion criteria.

Yes	1
No	0

Table 3
Conversion criteria.

High	1
Medium	0.5
Low	0

The measurement of the indicators requires access to platform's primary statistical data (limited to the researchers). Only three platforms provided numeric values to estimate the number of websites' general visits, the total number of unique visitors, the number of repetitive visitors, and the number of converted visitors. The numeric values indicate a considerable activity of the participants (e.g., over 90,000 visits, over 60,000 unique visitors, and over 30,000 repetitive visitors). Meanwhile, the indicator of the openness achievement of other platforms is medium/low due to the absence of data on visitors. The study includes the visual judgment of descriptive criteria based on the number of placed announcements or analysis of member activeness. The results reveal medium levels of contributors (2000–7000) in the majority of platforms.

The indicator of the diversity in engagement forms involves such criteria as the level of opportunities to disseminate knowledge (the community generated content), the application of game-based approach, and the level of adaptability to various age groups. The observation results reveal that only several platforms apply more than three knowledge dissemination mechanisms (e.g., Facebook, Twitter, LinkedIn, e-mail) to ensure the communication flexibility and maximum possibilities for engagement into their activities. The majority of the observed collaboration platforms use two mechanisms. Almost all platforms lack advanced competition or gamification elements. None of the platforms adapted their activities to different age groups. Thus, the level of adaptability to various age groups of the platforms is low.

The indicator of decentralization comprises the criteria in diversity of decision-making forms and equal opportunities to express and defend one's ideas. Diversity in the forms of decision making is low in the majority of platforms as they lack the technological solutions for decision making. Platforms with the diverse forms to express opinions create conditions to vote, publish ideas in the website, write e-mails, make calls, react in Facebook, etc. In terms of procedures ensuring impartiality and equal opportunities to express and defend one's ideas, high capacity communities provide the clear procedures on the content of published information and clearly describe the procedures of conduct. The medium capacity communities have provisions on equal rights as well as expose attempts to ensure the correctness of information and respect to personal opinions although fail to clearly state their aspirations.

Level of criticism, depth of problem analysis, and existence of anonymous engagement possibilities express the degree of interdependence. Communities with a medium technological support level offer opportunities to place personal information and react to the content. Others offer key instruments and encourage participants to share ideas about problem solution, but lack a clear system and waste the resources. Communities with a high technological support level offer advanced mechanisms of the participation. The level of completeness of alternative analysis is low in almost all platforms due to absence of the instruments for alternative analysis. With a few exceptions, communities choose to conduct such analysis in other environments. Medium-level platforms offer technical opportunities for the alternative analysis but with a limited use. As for the level of criticality, low-level platforms prevail since formal comments and closed discussions substitute the discussions based on critical opinions. The platforms of high criticality levels typically provide procedures to express the opposite opinions and discussions. Assessment of the problem analysis depth reveals that initiators raise issues in the low-level platforms, whereas public remains passive. In addition, problems in such platforms focus on the community's objectives rather than on the problem itself. Opportunities for public discussions are scarce as well. The subjects of medium problem analysis depth offer discussion opportunities, but fail to unfold the intensive discussions or comments on individual messages.

Two integrated components (a degree of transparent structure, norms, rules for self-organization, and a degree of distributed memory) assess the degree of transparency. The components indicate the average

Table 4
Collaboration platforms assessment results.

Co-creation Index Dimension	Value of the dimension	Quantitative evaluation (a number of paltforms)	Indicator (based on the Web analytics and/or qualitative analysis)
Degree of openness and flexibility	45.20	High = 0 Average = 15 Low = 15	Percentage of females in the community Percentage of different nationalities and age groups Super additivity (diversity in opinion, solutions, predictions, etc.) Degree of development of the external links Adaption for different age groups Conversion rate – the percentage of unique visitors who become the registered members Number of contributions/contributors
Degree in diversity of engagement forms	25.00	High = 0 Average = 12 Low = 18	Degree of participants (agents, members) Outbound 'sharing' activities (e.g., 'send to a friend' or 'share on Facebook') of the community content Realization of game-based approach Consistence of the network Network amplitude Degree of user friendliness, speed and convenience
Degree of decentralization	20.18	High = 2 Average = 12 Low = 16	Existence of diversity in forms for decision making (group/individual; evaluate/select/vote/consensus/averaging) Equal rights for participants
Degree of independence	35.16	High = 1 Average = 17 Low = 12	Level of criticism Depth of problem analysis Existence of anonymous engagement possibilities
Degree of transparency	40.64	High = 2 Average = 22 Low = 6	Degree of transparent structure, norms and rules for self-organization Degree of distributed memory
Degree of security	48.45	High = 6 Average = 18 Low = 6	Existence of privacy policy and anonymity possibilities Existence of mechanism for the anonymous offering of ideas Existence of mechanism for providing secure and legal activities, the protection of personal data

or low levels of transparency in the researched platforms. Average-level platforms provide general rules, organizational structure, and functions. Low-level platforms have no guidelines. High transparency platforms contain a freely available description of the norms and procedures, responsibilities, and limitations. The majority of the observed platforms present their aims, history, and projects in a brief form, and their "about" section implies the platforms' functions. Some of the observed objects provide comprehensive information, ranging from values, frequently asked questions, and community history to short movies. Two platforms explain the concepts/situational definitions and give guidance as to behavioral patterns in the encountered certain situations.

As to the degree of security, the evaluations of the platforms vary from low to high. High-security platforms provide actual procedures, inform introduced safety measures, and create preconditions to ensure anonymity and privacy. Low-security platforms refuse to publish such information. Medium security platforms introduce minimal requirements for the privacy and data protection. As to the level of anonymity, medium-level platforms are those with the limited options of anonymity (the actual use of community services and exchange of data requires a disclosure of personal information, but the screen name is anonymous). Low anonymity platforms identify active participants and encourage open expression of the opinions. High anonymity platforms create the conditions (and give advice) for their participants to maintain anonymity and allow the participant to decide on whether to use the anonymity guarantees.

5. Research limitations and recommendations

Determined values of the Co-creation Index dimensions allow analysis and comparison of the collaboration platforms. However, only the platforms composing the research sample are to apply for comparison. The study offers inadequate comparative value of the outcomes due to absence of an index obtained, designed, and tested in another territorial context. The assessment reveals the complexity of online activities in collaboration platforms. The evaluation demonstrates that some of the criteria attribute to more than one element of a framework. However, the unique criteria could have a different level of influence on different dimensions or be of different importance. Hence, ranking of each

criterion by relevance is not practical. The article leaves the analysis of the importance and causal correlations of diverse criteria for the upcoming research stages. Identification and validation of such relationships requires additional research techniques ensuring the collection and analysis of actual data and testing of hypotheses. The study suggests the use of independent or moderated access to the Google Analytics data of the platforms for increasing the validity. Future research should benefit from data mining and web scraping techniques in comparison to the homogenous platforms. These measures could improve the quality and reliability of the analysis (in the platforms with a limited number of contributors in particular). Greater samples of empirical data increase the validity of developed instrument by adjusting and improving the measurement scales.

6. Conclusions

A challenge for co-creation in networked platforms (online communities, social networks, networks of practice, etc.) is the organization of the collaboration between different actors. Collaboration platforms differ in terms of users or purpose, but they all share a number of common characteristics such as mass participant inclusion ensuing the greater intellectual capabilities and use of ICT technologies in creation and aggregation of knowledge.

The assessment results of 30 collaboration platforms demonstrate their potential for co-creation. Results show the highest values in the degree of security (48.45 from 100) and the degree of openness and flexibility (45.20 from 100), which correlates with the technological readiness and maturity of collaboration platforms. Research also points that platforms with high ideological and procedural levels engage with their members more efficiently and have more advanced technological preparedness. The degree of independence is 35.16 and the degree of independence is 40.64. The lowest value attributes to the degree of decentralization, followed by the degree of diversity in engagement forms. The results show implemented technical possibilities for the engagement with no motivation triggers or procedural explanations on it.

The evaluation of co-creation potential demonstrates promising tendencies in the online collaboration platforms in Lithuania. The observed communities successfully deal with problems and implement their

activities by learning and exchanging information, which creates the preconditions for the development of good co-creation practices and traditions in Lithuania.

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