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ABSTRACT

Value co-creation, is an emerging business and innovation paradigm, however, there is not enough clarity on the distinctive characteristics of value co-creation as compared to more traditional value creation approaches. The present paper summarizes the results from an empirically-derived research study focusing on the development of a systematic procedure for the identification of firms that are active in value co-creation. The study is based on a sample 273 firms that were selected for being representative of the breadth of their value co-creation activities. The results include: i) the identification of the key components of value co-creation based on a research methodology using web search and Principal Component Analysis techniques, and ii) the comparison of two different classification techniques identifying the firms with the highest degree of involvement in value co-creation practices. To the best of our knowledge this is the first study using sophisticated data collection techniques to provide a classification of firms according to the degree of their involvement in value co-creation.

Value co-creation, innovation, quantitative study, principal component analysis, empirical research, online innovation metric

INTRODUCTION

Value co-creation is an emerging business, marketing and innovation paradigm describing how customers and end users could be involved as active participants in the design and development of personalized products, services and experiences (Prahalad & Ramaswamy, 2000; Etgar, 2006, 2008; Payne, Storbacka, & Frow, 2008). It is based on the development of customer participation platforms providing firms with the technological and human resources, tools and mechanisms to benefit from the engagement experiences of individuals and communities as a new basis of value creation. The active participation of customers and end users is enabled through multiple interaction channels, very often by means of specifically designed technological platforms through the Internet (Sawhney, Gianmario & Prandelli, 2005; Nambisan & Nambisan, 2008; Nambisan & Baron, 2009). It should be pointed out that the value co-creation paradigm emerges by means of a terminology that oscillates between the semantics of two other paradigms – user-driven innovation (von Hippel, 2005; Bogers, Afuah & Bastian, 2010) and open innovation (Chesbrough, 2003). User-driven innovation distinguishes itself by promoting a single firm-driven, product-centric, non-transactional and participatory approach to user involvement in the design of new products and services. However, its focus on innovation toolkits (von Hippel, 2001) and innovation communities brings it close to the value co-creation paradigm with its focus on customer participation platforms, personalization of market offers, multiple stakeholder interactions and access to global resources (Prahalad et al., 2008), customer-driven business models, and virtual customer experience environments. On the other hand, the open innovation paradigm promotes a more generic and broader vision of the innovation landscape. It articulates the key mechanisms for inbound and outbound business and innovation processes, intellectual property, knowledge and resource flows used by firms to engage into a more proactive pursuit of new markets and innovations (Chesbrough, 2003). The participatory platform nature of value co-creation practices enables a broader and more systematic positioning of customers and end users across the entire innovation lifecycle leading to a significant enhancement of the user-driven innovation potential. As a result, the development of value co-creation platforms is increasingly recognized a promising innovation strategy associated with an ongoing change of the nature of innovation itself (Prahalad et al., 2003; Nambisan et al., 2009; Romero et al., 2009; Midgley, 2009; Bowonder et al., 2010). The co-creation paradigm positions the source of value within the co-creation experience which is actualized through the company-customer interaction events. By co-creating with the network, the customer becomes an active stakeholder in defining both the interaction and the context of the event including their specific personal meaning (Prahalad et al.,

2003). The personal nature of the interactive experiences enables new dimensions of value which are based on the quality and the personal relevance of the interaction events as well as on the opportunity for customers to co-create their own unique end products, services and experiences. These dimensions are critical for the emergence of experience innovation networks putting the individual at the heart of co-creation experience through the development, access and dynamic reconfiguration of appropriately designed technological, business process and human resource infrastructures (Prahalad et al., 2008). In this sense, the value co-creation paradigm represents a specific market-driven approach to the adoption of an open innovation business philosophy. It provides a dynamic understanding of firms' innovation boundaries which opens the possibility for a better competitive positioning through a better articulation of their innovativeness. Existing literature clearly emphasizes that customer participation in value co-creation activities should impact their innovation outcomes, such as innovation cost, time-to-market, new product/service quality and development capacity (Kristensson, 2008; Prahalad et al., 2008; Nambisan et al., 2009; Midgley, 2009; Romero et al., 2009; Bowonder et al., 2010; Ramaswamy et al., 2010). However, most of the existing studies are case-based and there is little quantitative research focusing on more quantitative research outcomes such as classifications schemes, relationships to innovation and performance metrics etc.

RESEARCH METHODOLOGY

Objective and research hypothesis
The objective of this article is to apply an empirically-derived quantitative approach providing a classification of firms in terms of their involvement in value co-creation practices. It is based on a previous study which identified the key components of value co-creation based on a methodology using web search generated data and Principal Component Analysis (PCA) techniques (Tanev et al., 2010). The objective of the present article consists in the extension of the work by Tanev et al. (2010) to provide the classification of the firms.

Methodology
Hicks et al. (2006) and Ferrier (2001) pioneered the concept that an analysis of the frequency of use of specific keywords on public websites and corporate news releases can be an adequate representation of the degree of importance the firms place on the concepts those keywords were chosen to represent. Allen et al. (2009) and Tanev et al. (2010) demonstrated that this concept could be applied to classify value co-creation practices and articulated the key steps of the data gathering and data analysis work flow. Their research showed that factor analysis of the frequencies of a specifically designed set of keywords can be used to extract the key components of value co-creation in a large sample of firms. The research methodology adopted in this article relies on value co-creation components derived by Tanev et al. (2010) and provides a systematic way of classifying the firms in terms of their involvement in value co-creation practices. Fig. 1 provides a visual representation of the sequence of the research steps.
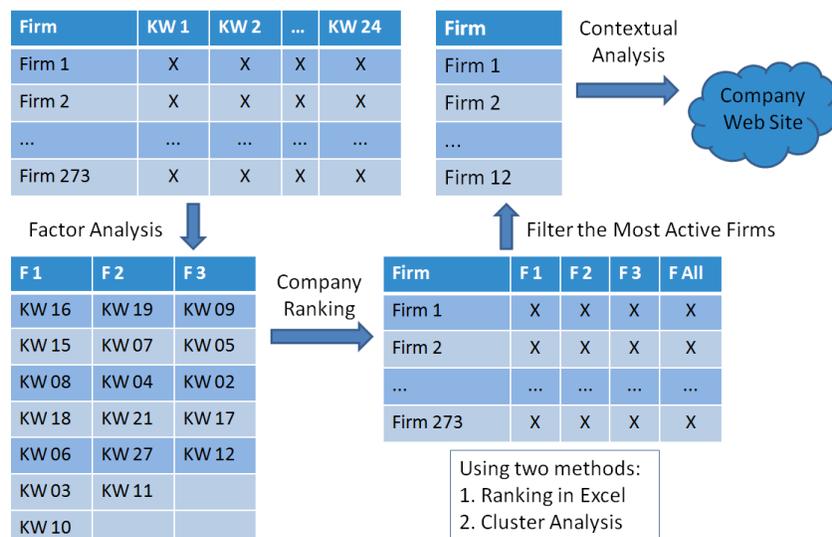

Figure 1. Visual representation of the research process.

The unit of analysis is the website of an organization actively engaged in value co-creation. The sample included 273 firms and four types of firms (described in Table 1).

Type of firms		Frequency	Percent	Valid Percent	Cumulative Percent
1	ECL	108	39.6	39.6	39.6
2	GEN	65	23.8	23.8	63.4
3	OSS	75	27.5	27.5	90.8
4	OSS+ECL	25	9.2	9.2	100.0
	Total	273	100.0	100.0	

Table 1. Breakdown of sample organizations: ECL – firms from the Eclipse Foundation, OSS firms, OSS+ECL – OSS firms from the Eclipse Foundation, GEN – general profile firms.

RESEARCH RESULTS

Value co-creation components

Table 2 shows the specific composition of the extracted principal value co-creation components that was used to construct three value co-creation component variables for each of the firms in the sample (Tanev et al, 2010). Based on these results, the first co-creation component was interpreted as "Resources, processes, tools and mechanisms enabling customer and user involvement in production, assembly, manufacturing and self-service aiming at design and process flexibility based on product modularity and sharing of internal expertise, resources and IP."

Component # 1	Loading
customer+OR+user+produce+OR+assemble+OR+manufacture	.727
product+OR+process+modularity+OR+modular+OR+module	.705
customer+OR+user+IP+OR+"intellectual+property"	.669
design+OR+process+flexibility+OR+flexible+OR+adaptable	.599
internal+expertise+OR+resource	.554
lease+OR+rent+OR+license+OR+"self+serve"+OR+"self+service"	.550
product+OR+process+OR+service+evolution+OR+evolve	.521

Component # 2	Loading
customer+partnerships+OR+interaction+OR+relationship+OR+participate+OR+participation+OR+activity+OR+action	.778
customer+OR+user+risk+manage+OR+management+OR+control+OR+assess+OR+reduce+OR+reduction+OR+potential+OR+ Exposure	.698
customer+OR+user+cooperate+OR+cooperation+OR+collaboration+OR+partnership	.691
cost+reduce+OR+reduction+OR+saving	.685
trust+OR+honesty+OR+integrity+OR+transparency	.647
customer+OR+user+experience	.627

Component # 3	Loading
customer+OR+user+learn+OR+learning	.752
customer+OR+user+suggest+OR+suggestion+OR+input+OR+request+OR+ demand	.737
customer+OR+user+OR+forum+OR+connect+OR+network+OR+networking	.716
customer+OR+user+options+OR+choice+OR+choose	.524
customer+OR+user+test+OR+trial+OR+beta	.512

Table 2. Composition of the three principal value co-creation components

Site	Type	Size	F1	F2	F3	F All	F1 N	F2 N	F3 N
http://queue.acm.org/	ECL	759	57.129	63.808	94.808	215.745	0.58	0.37	0.43
http://www.accurev.com/	ECL	716	56.306	43.971	94.597	194.874	0.57	0.26	0.43
http://www.brocade.com/	OSS+ECL	1800	98.313	71.490	97.822	267.625	1.00	0.42	0.45
http://www.compiere.com	OSS	303	29.818	45.495	81.180	156.493	0.30	0.27	0.37
http://www.compuware.com/	ECL	266	26.125	90.334	144.806	261.264	0.27	0.53	0.66
http://www.convergys.com/	GEN	799	64.995	87.585	96.139	248.719	0.66	0.51	0.44
http://www.iwaysoftware.com/	ECL	385	49.525	123.515	115.644	288.685	0.50	0.72	0.53
http://www.kpitcummins.com/	ECL	553	26.472	86.465	65.990	178.926	0.27	0.50	0.30
http://www.misysbanking.com/	OSS+ECL	628	26.317	74.581	59.379	160.276	0.27	0.43	0.27
http://www.mks.com/	ECL	591	49.980	93.855	75.178	219.013	0.51	0.55	0.34
http://www.tibco.com/	ECL	1010	49.406	141.061	105.252	295.719	0.50	0.82	0.48

Figure 2. List of the (11) firms employing "123" strategy (threshold component value of 0.25).

Site	Type	Size	F1	F2	F3	F All	F1 N	F2 N	F3 N
http://aws.amazon.com/	GEN	599	19.723	44.427	112.897	177.046	0.20	0.26	0.52
http://www.aldon.com/	ECL	226	19.854	54.115	116.411	190.379	0.20	0.32	0.53
http://www.innovations-software.com/	ECL	453	16.913	82.021	59.100	158.034	0.17	0.48	0.27
http://www.knowledgetree.com	OSS	466	23.253	51.273	93.623	168.150	0.24	0.30	0.43
http://www.polarion.com/	ECL	237	16.128	53.423	104.630	174.181	0.16	0.31	0.48
http://www.zensar.com/	ECL	312	14.933	171.595	107.509	294.037	0.15	1.00	0.49

Figure 3. List of the (6) firms employing "X23" strategy (threshold component value 0.25).

Site	Type	Size	F1	F2	F3	F All	F1 N	F2 N	F3 N
http://www.gepower.com/	GEN	3950	33.219	45.190	51.459	129.868	0.34	0.26	0.23
http://www.project-open.com	OSS	174	34.035	44.499	53.489	132.022	0.35	0.26	0.24

Figure 4. List of the (2) firms employing "12X" strategy (threshold component value 0.25).

Site	Type	Size	F1	F2	F3	F All	F1 N	F2 N	F3 N
http://www.altera.com/	GEN	9610	59.157	42.112	75.563	176.831	0.60	0.25	0.35
http://www.blackducksoftware.com/	ECL	417	74.544	39.088	117.266	230.898	0.76	0.23	0.54
http://www.curl.com/	ECL	250	35.495	28.824	75.937	140.257	0.36	0.17	0.35
http://www.db4o.com	OSS	473	36.593	22.415	76.641	135.649	0.37	0.13	0.35
http://www.enea.com/	ECL	1250	25.280	24.256	54.954	104.490	0.26	0.14	0.25
http://www.icesoft.com	OSS	87	33.629	34.377	66.531	134.537	0.34	0.20	0.30
http://www.latticesemi.com/	GEN	2050	72.048	34.652	80.256	186.956	0.73	0.20	0.37
http://www.lsi.com/	ECL	2520	42.713	28.086	58.143	128.942	0.43	0.16	0.27
http://www.lynuxworks.com/	ECL	1220	93.571	26.591	124.965	245.126	0.95	0.15	0.57
http://www.mozilla.com/en-US/	OSS	522	39.380	21.092	71.271	131.743	0.40	0.12	0.33
http://www.parasoft.com/	ECL	646	42.328	38.992	115.665	196.986	0.43	0.23	0.53
http://www.perforce.com/	ECL	1730	31.707	17.450	62.005	111.162	0.32	0.10	0.28
http://www.ponoko.com/	GEN	670	36.206	7.145	90.700	134.052	0.37	0.04	0.41
http://www.radview.com	OSS	220	32.280	36.319	124.860	193.459	0.33	0.21	0.57
http://www.sybase.com/	ECL	6330	37.199	37.052	90.243	164.494	0.38	0.22	0.41
http://www.tensilica.com/	ECL	770	76.905	38.388	72.483	187.775	0.78	0.22	0.33
http://www.trixbox.com	OSS	150	32.603	20.859	64.962	118.424	0.33	0.12	0.30
http://www.vyatta.com	OSS	275	26.672	17.231	67.436	111.338	0.27	0.10	0.31
http://www.wavemaker.com	OSS	115	33.412	29.165	55.434	118.011	0.34	0.17	0.25

Figure 5. List of the (19) firms employing "1X3" strategy (threshold component value 0.25).

The second co-creation component was interpreted as "Customer relationships enabled through partnerships and cooperation aiming at cost reduction, design and process flexibility, and leading to better customer and end user experiences based on risk management, transparency and trust." The third co-creation component was interpreted as "Mutual learning mechanisms based on the existence of user networking forums enabling customer suggestions, input, demands and requests, and leading to multiple options for users through involvement in test and beta trials." Table 3 shows the descriptive statistics of the three co-creation variables that were constructed by adding up the ratings of each of the keywords weighted by their loadings.

CLASSIFICATION OF FIRMS

Classification based on a minimum 'threshold' component value
The first classification procedure uses the composition of the factors to construct the value co-creation components values for each of the firms in the sample by summing up all the variables in a given factor weighted by their specific loadings. The co-creation component variables were normalized to their maximum values and a minimum 'threshold' component value (between 0.2 and 0.3) was used to identify the firms that are active in a specific component. Firms with a value co-creation component value below this 'threshold' value were assumed as being not active in that particular component. The 'threshold' value approach allows the identification of groups of firms employing a specific combination of value co-creation components (activities).

These combinations were called approaches or strategies, assuming that in order to consider a specific combination as a deliberate "strategy", it needed to include minimum 2 co-creation components. Fig. 2, Fig. 3, Fig. 4 and Fig. 5 provide the lists of the firms employing "123", "X23", "12X" and "1X3" value co-creation strategies (the X in the strategy label indicates a low activity in that particular value co-creation component). In this way, "123" type firms are expected to be the most active in value co-creation. Implementing this procedure in a Microsoft Excel tool provided a way to provide a visual illustration of the classification of the firms. The graphs show the firm website, the type of the firm, the number of web pages, the value of each of its components (F1, F2, and F3), the total co-creation component (F All), and the normalized co-creation components (F1N, F2N and F3N). The results indicate the ability of the suggested classification procedure to indentify groups of firms employing the same co-creation strategy. The firms employing the "123" strategy are the ones that are expected to have the broadest scope and degree of co-creation activities. It should be pointed out that choice of the minimum threshold value affects the distribution of the firms in the four different strategy types. The higher is the threshold value, the sharper is the difference between the co-creation characteristics of the firms across strategy type. The specific choice of the threshold value is driven by the desire to achieve better explanatory power.

Classification based on cluster analysis
The second classification of the firms is based on the application of K-Means Cluster analysis to the three value co-creation variables. A test and trial approach led to the decision that there were 3 distinctive clusters. Table 3 shows the three final cluster centers. Table 4 shows the number of cases in each cluster.

	Cluster		
	1	2	3
Component 1	43.64606	23.75002	10.79420
Component 2	98.75530	24.81269	9.69689
Component 3	92.87516	70.94444	21.60107

Table 3. Final cluster centers of the three emerging clusters.

Cluster	1	11
	2	96
	3	166
Total		273

Table 4. Number of cases in each of the three clusters.

	Site	Type	SiteSize
1	http://queue.acm.org/	ECL	759
2	http://www.brocade.com/	OSS+ECL	1800
3	http://www.compuware.com/	ECL	266
4	http://www.convergys.com/	GEN	799
5	http://www.innovations-software.com/	ECL	453
6	http://www.iwaysoftware.com/	ECL	385
7	http://www.kpitcummins.com/	ECL	553
8	http://www.misysbanking.com/	OSS+ECL	628
9	http://www.mks.com/	ECL	591
10	http://www.tibco.com/	ECL	1010
11	http://www.zensar.com/	ECL	312

Figure 6. List of the (11) firms that were found to be most active in co-creation on the basis of the cluster analysis.

The results shown in Table 3 and Table 4 indicate that the first cluster groups the firms with the highest degrees of activity in each of the three components. It is expected that this particular cluster would correspond to the group of firms employing strategy "123". Interestingly enough, the cluster analysis results for the firms most active in value co-creation provides a group of 11 firms (Fig. 6) – the same number of forms as in the case of the classification based on the normalized co-creation components with a minimum threshold value.

ANALYSIS

Comparing the list of firms shown in Fig. 6 and Fig. 2 indicates a surprisingly high degree of coincidence between the results generated by the two different classification methods: 9 out of the 11 firms are exactly the same (assuming that the minimum threshold value for each of the normalized co-creation components is 0.25). The cluster analysis classification approach replaces two of the firms (www.accurev.com and www.compiere.com) with another couple (www.innovations-software.com and www.zensar.com). A closer analysis of the ranking of the active firms in the two lists shows that the cluster analysis approach selects the most active firms based on a total co-creation component value independent of the specific values of the individual components, while the approach suggested in this thesis selects the most active firms by looking for a minimum value in each of the co-creation components. This could explain why www.innovations-software.com and www.zensar.com do not appear in Fig. 2 as part of the firms employing a "123" strategy and do appear in Fig. 6 as part of the firms employing an "X23" strategy. However, their total value co-creation component variables are larger than www.accurev.com and www.compiere.com. The high degree of coincidence between the results for the moist active firms provided by the two different classifications is a clear indication about the self-consistency of our research methodology.

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