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# TOWARDS THE DEVELOPMENT OF A RESEARCH METHODOLOGY FOR STUDYING THE NATURE OF VALUE CO-CREATION IN INTERNET DRIVEN BUSINESSES

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## I. Introduction

Value co-creation, is an emerging innovation, marketing and business paradigm describing how customers and users are seen as active participants in the design of personalized products, services and experiences (Prahalad & Ramaswamy, 2004; Payne, Storbacka, & Frow, 2008). Often this participation is organised via the Internet to enable the opportunity for customers to integrate their knowledge, experience and skills into existing, modified or entirely new market offerings reflecting their personal preferences, needs and contexts (Sawhney, Gianmario & Prandelli, 2005). There is a growing body of literature dedicated to the discussion of value co-creation frameworks, mechanisms and processes, however, these typically focus on the study, discussion and analysis of a small number of cases using deep, ethnographic description of their practices aiming at conceptualization and categorization of the different types of interactions between end users, the firm and the value network. Although very useful, such an approach misses the advantages of an empirically driven quantitative approach that would be able to benefit from larger size samples of firms and that could be more appropriate for theory building through the development and testing of hypotheses.

It is important, therefore, to seek the development of a research methodology that would be able to combine the benefits of both qualitative and quantitative research approaches to studying the nature of value co-creation. The present paper suggests a way of how is this to be done by providing a first attempt to identify the main research steps of such methodology. It provides some preliminary results on the key components of value co-creation between firms and end uses or customers based on the application of web search and Principal Component Analysis (PCA) techniques. The analysis of these preliminary results is then used as an opportunity to identify a number of research questions to be addressed in future research. The emerging research questions follow the inner logic of the value co-creation phenomenon as well as the nature of the results reported in the present paper. Fortunately, the specific nature of the results was found to be suitable for the application of the so-called small-N techniques such as the Qualitative Comparative Analysis (QCA) technique which combines the advantages of both qualitative and quantitative techniques. One of the main contributions of this paper is to suggest and explore the possibility for using the QCA technique in future research on value co-creation.

## II. Research objective, strategy and method

Our research has two main objectives. First, to use website content and exploratory factor analysis techniques in developing and validating a model that can be used to provide a categorization of the value co-creation approaches employed by a large sample of companies using the internet as a channel to enable value co-creation with end users and customers. Second, to identify some key research questions in association with a methodology combining the benefits of both, quantitative and qualitative, approaches for a deeper study of the components of value co-creation.

### 1. Research strategy

An extensive study of the literature on value co-creation, complemented by the examination of a number of specific websites, was used to develop a list of keyword combinations representing the largest possible spectrum of the dimensions associated with value co-creation. The resulting list of keywords were the terms used in a web search of a large sample of publicly available websites to gather data representative of the presence of the various co-creation dimensions. The data enabled the use of PCA in identifying a set of underlying factors that characterize the specific emerging types of value co-creation present in the sample of firms. This approach builds on previous works using keyword analysis (Ferrier, 2001) and web data mining techniques (Hicks et al., 2006; McGinnis, 2008; Lombardi, 2009). It is based on two main findings: i) the majority of small and medium-size firms use their web pages to articulate their commercialization strategies (Hicks et al., 2005), and ii) firms involved in value co-creation activities use the internet as an important channel for value co-creation (Pralhad et al., 2004; Sawhney et al., 2005).

### 2. Sample selection

The unit of analysis is the website of an organization actively engaged in value co-creation. The sample included 287 companies selected on the basis of two criteria: i) company's commercialization strategy included co-creation activities, ii) its website contained between 50 and 1,550,000 sub-pages.

Table 1. Breakdown of sample organizations

Organization Source	Number	Percent of total
Open Source Software companies	61	21%
Eclipse Foundation organizations	140	49%
Others	86	30%

There were three types of companies (Table 1) – Open Source Software (OSS) companies, organizations associated with the business ecosystem driven by the Eclipse Foundation,<sup>1</sup> and others.

### 3. Keyword selection

The keywords list consisted of 29 combinations of words. Table 2 shows a breakdown of one specific keyword combination with an example of a specific context from which each word was derived.

Table 2. Example of a keyword set structure, source and context

Keyword: (customer OR user) AND (suggest OR suggestion OR input OR request OR demand)		
Keywords	Source	Context
customer OR user	Researcher	Qualifier used to eliminate pages which do not describe activities involving <b>customers</b> or <b>users</b>
Suggestion	Facebook developers' forum	"You can <b>suggest</b> your idea through the <b>suggestion</b> form"
Input	TSMC on-line newsletter	"TSMC will be even more diligent in seeking <b>customer input</b> "
Request	Secondlife grid dev. forum	"To submit a <b>request</b> to participate in the Reg API progra"
Demand	Facebook dev. forum	"...but still maintaining the sense of security <b>users demand</b> "

<sup>1</sup> <http://www.eclipse.org/>

#### 4. Data acquisition and analysis

The Keyword Search Tool provided the counts of “hits” for each search term at each website normalized by the total number of web pages present at the website. PCA was selected as the factor extraction method for factor analysis since it provided the cleanest component loading table.

### III. Research results

Tables 3-6 below show the resulting four extracted components with their associated keywords and loadings. The methodology was validated by another arbitrary sample of firms.

Table 3. Factor 1

Variable	Loading
(customer OR user) AND (learn OR learning)	0.74
(customer OR user) AND (communities OR community OR network OR networking OR forum)	0.71
(customer OR user) AND (suggest OR suggestion OR input OR request OR demand)	0.67
(customer OR user) AND (dialog OR dialogue OR communicate OR communication OR conversation OR contact OR feedback OR call OR interact OR “information sharing “ OR engage)	0.56

Table 4. Factor 2

Variable	Loading
internal AND (expertise OR resource)	0.72
cost AND (reduce OR reduction OR saving)	0.70
customer AND (partnerships OR interaction OR relationship OR participate OR participation OR activity OR action)	0.65
(design OR process) AND (flexibility OR flexible OR adaptable)	0.65
(customer OR user) AND (cooperate OR cooperation OR collaboration OR partnership)	0.55
(customer OR user) AND (risk manage OR management OR control OR assess OR reduce OR reduction OR potential OR exposure)	0.53
trust OR honesty OR integrity	0.53

Table 5. Factor 3

Variable	Loading
(customer OR user) AND (options OR choice OR choose)	0.68
integrated AND online AND services	0.66
customization OR customize OR customized OR personalize OR individualize OR “add feature “ OR “added feature “	0.59
(product OR process) AND (modularity OR modular OR module)	0.46
ecosystem OR “value network” OR “value constellation” OR “multiple partners” OR “external contributor” OR “external source”	0.46

Table 6. Factor 4

Variable	Loading
(customer OR user) AND (disclose OR inform OR disseminate OR reveal)	0.58
(customer OR user) AND (produce OR assemble OR manufacture)	0.57
(customer OR user) AND (IP OR “intellectual property “)	0.50
(customer OR user) AND (test OR trial OR beta)	0.44

#### **IV. Factor interpretation**

*The first factor* could be identified with a value co-creation component that was labelled “Community Forum for Open Dialog and Learning.” It could be interpreted as an indicator of the presence of a community forum designed to engage customers in an open dialog including networking, information sharing and learning activities with the organization, other customers or other members of the value network.

*The second factor* could be identified with a value co-creation component that was labelled “Partnerships for Resource Sharing.” It could be used to describe the emergence of partnerships enabling user access to company expertise and resources, participation in and creation of adaptable designs and processes aiming at reducing the cost of offerings and based on trust, integrity and risk management.

*The third factor* could be identified with a value co-creation component that was labelled “Personalization via Options and Modularity.” It could be interpreted to mean the personalization of offers through partnerships across the value network to provide choices and options enabled by product and process modularity, and integrated online services.

*The fourth factor* could be identified with a value co-creation component that was labelled “Co-production” and used to describe the co-production of offers by user involvement in manufacturing, assembly and final beta trial activities; requiring disclosure and sharing of intellectual property.

#### **V. Emerging types of value co-creation approaches**

We suggest that the four value co-creation components could be interpreted in two complementary ways: i) in different combinations - as the components of different value co-creation strategies, or ii) as stages of a value co-creation maturity model based on the gradual development of the resources and capabilities enabling firms to sequentially engage in the value co-creation activities described in components 1, 2, 3 and 4. Our analysis will focus on the identification of the different ways companies use to combine some of the value co-creation components to develop specific value co-creation approaches as part of their business models.

##### *1. Value co-creation component scoring*

The keyword frequency table that was generated by the web search procedure was used to calculate value co-creation component scores for each company (or website). Reinard (2006) recommends that researchers either simply sum the values of the variables loaded on a specific component or scale the values based on the associated communalities before summing them (Reinard, 2006, p. 424). Both approaches were tried and, since there was not a significant variation in the resulting distribution, a simple sum of the variables was used. The value co-creation component scores were averaged over the complete sample of firms to allow the components to be ranked in terms of the corresponding level of activity found in the research sample. Component 1 (Community forum for open dialog and learning) was found to be the dominant with over twice the average scores of the other 3 components; followed by components 2, 3 and 4 respectively.

Fig. 1 shows the average rating of the value co-creation components for all firms. The application of the Mann-Whitney non-parametric test for comparing the means of variables from independent samples indicates that with the exception of factors 2 to 3 there is a statistically significant difference (2-tailed asymptotic sigma value = 0.000) between the means of all four components.

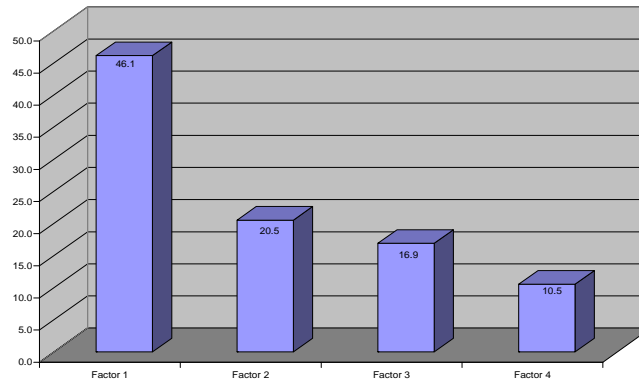


Figure 1. Average value co-creation component rating for all firms in the sample (in %)

## 2. Groups of firms manifesting high degrees of value co-creation

Using the scores calculated in the way described above, the websites were ranked to identify the companies most active in the adoption of each of the four value co-creation components.

Table 7. Group Code Organizations active in all value co-creation components

Group Code	Organization URL	Firm Type	
1234	<a href="http://www.latticesemi.com/">http://www.latticesemi.com/</a>		
1234	<a href="http://www.altera.com/">http://www.altera.com/</a>		
1234	<a href="http://aws.amazon.com/">http://aws.amazon.com/</a>		
1234	<a href="http://www.ddci.com/">http://www.ddci.com/</a>		Eclipse
1234	<a href="http://www.salesforce.com/">http://www.salesforce.com/</a>		Eclipse
1234	<a href="http://www.curl.com/">http://www.curl.com/</a>		Eclipse
1234	<a href="http://www.linuxworks.com/">http://www.linuxworks.com/</a>		Eclipse
1234	<a href="http://www.brocade.com/">http://www.brocade.com/</a>	OSS	Eclipse
1234	<a href="http://www.intervoice.com/">http://www.intervoice.com/</a>	OSS	Eclipse
1234	<a href="http://www.progress.com/">http://www.progress.com/</a>	OSS	Eclipse
1234	<a href="http://www.tibco.com/">http://www.tibco.com/</a>		Eclipse
1234	<a href="http://www.parasoft.com/">http://www.parasoft.com/</a>		Eclipse
1234	<a href="http://www.polarion.com/">http://www.polarion.com/</a>		Eclipse
1234	<a href="http://www.digium.com">http://www.digium.com</a>	OSS	
1234	<a href="http://www.db4o.com">http://www.db4o.com</a>	OSS	
1234	<a href="http://www.radview.com">http://www.radview.com</a>	OSS	
1234	<a href="http://www.pentaho.com">http://www.pentaho.com</a>	OSS	

The top 25% (71) scoring websites in each component were considered to be the “most active” in terms of that component. For all four components, the top 25% of firms represent greater than 80% of the scores’ dynamic range. The resulting four sets (141 different websites) were analyzed to identify the different groups of active firms using each of the 15 possible different combinations of value co-creation components. Each group of active firms was assigned a code indicating the composition of the components used by the group, for example, code 1234 indicates that this group of firms was among the top 25% most active in all 4 components. The list of active websites in the 1234 code group is given in Table 7. Table 8 lists the number of active firms in each of the 15 groups.

Table 8. Distribution of the organizations active in value co-creation

Code	Value Co-creation Approach	# of firms	Percent
1	Community Forum for Open Dialog	12	4.2%
2	Resource Sharing	14	4.9%
3	Personalization	18	6.3%
4	Co-production	16	5.6%
12	Resource sharing communities	8	2.8%
13	Personalization through community	3	1.0%
14	Co-production through community	5	1.7%
23	Personalization through resource sharing	5	1.7%
24	Co-production through Resource sharing	3	1.0%
34	Personalization through co-production	8	2.8%
123	Personalization through resource sharing in communities	9	3.1%
124	Co-production through resource sharing in communities	11	3.8%
134	Personalization through co-production by communities	7	2.4%
234	Co-production of personalized offerings through resource sharing	5	1.7%
1234	Full scale co-creation	17	5.9%

We consider a company as intentionally engaged in value co-creation if it actively employs a combination of minimum 3 value co-creation components. Each of these combinations is associated with a distinct value co-creation approach. Table 9 shows that there are three types of value co-creation approaches that are actively used by more than 3% of the firms in our sample:

Table 9. Value co-creation approaches found in the research sample

Code	Value co-creation approach	# of firms	Percent
1234	Full scale co-creation	17	5.9%
124	Co-production through resource sharing in communities	11	3.8%
123	Personalization through resource sharing in communities	9	3.1%

## VI. Some suggestions for future research

Opportunities for future research include:

- Refinement the initial set of keywords to take into account other aspects of co-creation such as new distribution channel development and new niche creation.
- Development of case studies of the emerging groups of firms (most active in co-creation) to verify that the companies' business strategies are accurately represented by the proposed group description, validate the interpretations of the components and examine the ICT infrastructures that enable particular value co-creation components.
- Development of a research methodology based on a longitudinal study of a large sample of companies by periodically replicating the methodology used here to examine the temporal emergence and evolution of their value co-creation approaches as part of their business models. Such a study could be complemented by parallel studies using new and refined sets of keywords to test the emergence of new industry trends and business models. This approach could be used to validate whether the components of value co-creation can be used to construct a maturity model for how best to introduce the capabilities of value co-creation over time.
- Development of a similar research methodology to examine the relationship between the degrees of value co-creation and innovation. Such methodology would require the development of a

second set of keywords focusing on innovation measures and on using regression analysis to examine the relationship between value co-creation and innovation components in the way they emerge from the factor analysis. This research opportunity could be also used to study the user driven innovation potential of value co-creation platforms.

There is a variety of research questions that could emerge in association with the research opportunities discussed above. These research questions could be structured around the following tasks:

- Identification of the distinguishing characteristics of the different types of value co-creation platforms
- Operationalization of the distinguishing value co-creation components by mapping them into measurable constructs
- Development of reliable and robust measurement instruments to benchmark value co-creation capability across firms, market segments and industries
- Identification of the degrees and the types of metrics that could be used to describe the user-driven innovation capacity of value co-creation platforms by taking into account the emergent nature of their innovation measures
- Development of generic value co-creation platform design rules together with managerial recommendations for their practical implementations in specific business circumstances
- Articulation of the distinction between user-centric (participatory) vs firm centric (business orchestration) views of co-creation including the managerial specifics of both nodal firms and value network partners
- Examining the types of organizational and technological infrastructures of value co-creation platforms enabling user-driven innovation
- Examining the value network configurations enabling the design of value co-creation platforms
- Examining the technological pathways and business development patterns enabling the design of value co-creation platforms
- Examining the types of interactions taking place between the different stakeholders engaged in a particular innovation type – incremental vs radical, technological vs non-technological, process vs product or service, product or service vs experience, etc
- Examining the relationship between the degrees of value co-creation and customer satisfaction, user innovation and user experience personalization
- Examining the relationship between the degrees of value co-creation and performance in terms of value network members' profitability
- Examining the relationship between the degrees of value co-creation and the growth of the user community.

### **VIII. Using Qualitative Comparative Analysis to further study the nature of value co-creation**

The application of QCA for a deeper study of the nature of value co-creation represents a particular interest. The QCA technique represents a synthetic strategy standing in between the purely grounded theory and quantitative techniques (Rihoux & Ragin, 2008). QCA techniques are “case oriented.” They typically deal with a more comprehensive analysis of 2 to ~15 complex cases in a ‘configurational’ way, i.e. the cases are selected in way that differentially manifests a particular property under investigation. In QCA the researcher could choose to focus on the more deductive research aspects by engaging in dialogue between cases and relevant theories. However, QCA techniques could also be used in a more inductive way by gaining insights from case knowledge in order to identify the critical key distinguishing aspects of a given phenomenon (Rihoux & Ragin, 2008). This aspect of QCA was found of particular importance for studying value co-creation since our



initial research identified three types of value co-creation approaches that were coded as 1234, 124 and 123. The reason for this is two-fold: i) each of the three approaches differs from the other two in a key single value co-creation component, and ii) the sizes of the three groups of companies fits perfectly the requirements of the QCA method. The richness of possibilities provided by the QCA technique and the possibility for its application to the study of emergent phenomena in combination with longitudinal field research approaches (Pettigrew, 1990) represents a key motivation for its selection as part of our future research.

## VII. Conclusions

The paper provides the first empirical identification of the components of value co-creation and the specific practices employed by companies engaged in a particular value co-creation component. The results are used to identify groups of companies employing different co-creation approaches as well as to identify a number of research questions that could be addressed in future research by means of a research methodology combining the benefits of both quantitative and qualitative research approaches.

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