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**Incremental Knowledge:  
Legitimation of Cooperative  
Knowledge Generation**

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**Incremental Knowledge:  
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**Abstract**

Entering the age of information technology, mass cooperative knowledge generation (CKG) has risen as an alternative to academic knowledge generation and commercial knowledge generation. Because CKG provides similar functions as academia, the academic study of CKG can take the form of a study of a rival paradigm which is an alternative to academia, hence generating a reflexive study, or as a novel social phenomenon generated by technological change. CKG contributes to the establishment of a cooperative knowledge repertoire with changes to its content inflicted incrementally by members of the public. Both enablers and constraints affect the development of CKG in three aspects: technology, personality and society. This paper discusses legitimacy issues involving both the generation process and the content of CKG.

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## Introduction

When social reconstructionists pioneered sociology of knowledge, the intelligentsia occupied a special place which watched the rest of humanity from a distance and decided their own mentality and alliance, witnessing knowledge as ideology at work in politics, the most influential realm of society (Mannheim 1954). This overarching perspective of academia defines what it is not but is less informative on the mechanisms driving its own development and directions. By focusing on the elite and the powerful, the implicit assumption of the dominance of the elite in knowledge qualification and generation was reflective of the academics' view of academia as extra-societal and restrained from the subject of inquiry. On the other hand, Mannheim's critic Popper (1945) subtly indicated political motives behind academics' alliance. Academics as occupying special places in society were much reduced in later grand theories such as phenomenology, which explains society without excluding academia. The special role of elites is gone and they are also marginalized members of the society, specialized in providing alternative ways of defining reality and offering abstract knowledge distant from practice (Berger & Luckmann 1967). Towards the late 20<sup>th</sup> century, another wave of academic studying emerged. The new sociology of knowledge, under the dominance of American pragmatism and following fragmentation of sociology, divides empirical studies into various themes in academia, such as power dynamics and organization of academic institutions in various historical periods (e.g. Asad, 1986; Gerson, 1983; LeMaine, Macleod, Milkay & Weingart, 1976; Zaret, 1985).

However, besides academic developments, extra-academia changes in society can also change the course of the sociology of knowledge. The rise of information technology around the early 21<sup>st</sup> century has led to massive collaboration among members of the public, leading to the establishment of the cooperative knowledge repertoire, the totality of state-of-the-art human knowledge. Sociology of knowledge develops in the same time frame as the use and mode of knowledge generation in society. Just as in other social sciences, the study of society may not coincide with societal developments and gaps can emerge. Academic schools of thought take their trajectory from both social facts and theoretical developments within the boundary of universities, circles fostered by academic coalitions and the criticisms in-between; society changes at the same time.

With the rise of information technology, especially during the late 20<sup>th</sup> and early 21<sup>st</sup> century, the rapid growth of knowledge generation and interactive sharing has changed the landscape of information flow when compared with the previous, industrial age. Academic disciplines have yet to catch up with these new developments and produce theories and empirical findings to make sense of the situation. Research needs time and this naturally creates a time gap from the emergence of phenomenon to its detection by, and popularization in, academic circles and research. This leads to occasions when debates in academic circles are at a distance from what society is and is concerned with.

This can be perceived as a problem if one considers sociology *a priori* as the study of the present, practical or relevant. The danger of ‘losing relevance’ is of particular concern for stakeholders such as policy makers and pressure groups concerned with the present, requiring information and analysis of current social problems and developments. The debate over relevance can also occur within academia, affecting its disciplinary development.

The falling costs of information generation and transfer cause an explosion of information. Originally, the internet acted as interconnected websites from which users searched for information from static sources, known as the client-server mode. This was followed by ever increasing interactivity from personal websites, newsgroups, message boards and blogs. The amount of information and knowledge in the ‘blogosphere’ is astonishing, but the form of knowledge generation in this sphere is rather solitary. Main interactions include mutual reading of blogs and leaving comments, the generation of blog content is mainly in the hands of the blogger, providing information on daily life, hobbies or news.

Nevertheless, as the internet matures into the social interaction of Web 2.0 and 3.0, the means of knowledge production also moves towards institutionalization, enabling massive cooperation. Besides the academic means of generating knowledge, the opportunity to generate knowledge institutionally by the mass leads to an alternative mode of knowledge generation, known as cooperative knowledge generation (CKG). This includes open source projects in the programming community which, for example, led to the construction of Linux, and projects which aim to provide open content such as the online encyclopedia Wikipedia. To trace the institutionalization of CKG projects, the development of Wikipedia, as a prime example of CKG, is explored in the following section.

## **Development of Cooperative Knowledge**

### *Institutionalization*<sup>1</sup>

This section gives a brief overview of Wikipedia’s early development.

Wikipedia started as an ideologically driven project. It originated from Nupedia, Jimmy Wales’s first attempt to build an on-line encyclopedia which embraced the ideology of free information. Consequently, under this ideology, Nupedia and Wikipedia have to provide free content, an endeavor also shared by projects from the free software movement and the open source movement. Nupedia’s expert-written expert peer-reviewed process seriously limited its development in terms of the number of volunteers and articles created. The extrinsic motivation that academic institutions harness does not exist in Nupedia, resulting in a misplaced rewards system. The structural tension

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<sup>1</sup> This subsection on institutionalization is a brief summary of the three papers Yam (2012a, 2012b, 2013). Readers who are interested in the establishment of Wikipedia and its institutionalization can refer to the original papers. Those who have read the three papers may skip to the next subsection on legitimation.

between its volunteering nature and its mode of academic knowledge generation caused its downfall.

After Wales's profit-making website Bomis proved to provide insufficient funding for Wikipedia, Wales had to find alternative means of acquiring capital. The Wikipedia community opposed advertising on the website, with concerns over compromising the encyclopedia's neutral point of view. Consequently, Wikipedia reoriented as a charitable organization, repositioning itself further from the commercial world. Wikipedia's co-founder Larry Sanger left the project and afterwards expressed concerns over the project's 'dominance of difficult people' and anti-elitism (Sanger 2004). Although Wikipedia is often characterized as built by the crowd, experts from various knowledge fields, both 'higher' art and pop culture, necessarily play a significant role. While Wikipedia needs to attract expert editors, the website also has to maintain its ideology, which encourages knowledge sharing and egalitarianism. Wikipedia uses talk pages and voting to exchange ideas and settle disputes, relying on textual validity rather than educational credentials for editing decisions.

The constant necessity for fighting non-academic intentions, including vandalism, attacks, advertisement and propaganda, fostered the website's institutionalization by heightening the social hierarchy and role differentiation. Institutionalization came as a result of the need to coordinate exponentially increasing numbers of voluntary editors and respond to societal needs. Various levels of editing privileges, supposedly based on merit, started to emerge. This included the blocking of troublemaking users and the promotion of competent editors for more editing privileges. On one hand, when it comes to contentious materials such as scandals involving biographical content, members of the public which feel victimized by the encyclopedia content may generally oppose the idea of an online cooperative encyclopedia or CKG, threatening its existence. On the other hand, society can also help the improvement of CKG projects, for example, media coverage of non-academic contributions, followed by an investigation by a Wikipedia editor has led to the deletion of non-academic content. While voting results determine the elevation of editing privileges, the web developer also has to actively participate in policy shaping and act as the spokesperson to the general public, especially when controversies occur.

### *Legitimation*

Unlike traditional knowledge generation paradigms, CKG projects such as the Open Directory Project, Linux and Wikipedia emerge in the internet and share its culture of sharing. This enables high levels of cooperation, and through the expanding scale of the internet, brings together large numbers of people with common interests. Several key factors affect the development of CKG and how the public perceives its accuracy and usefulness, contributing to its legitimacy. These include academic input, ideologically driven policies, legality, and user interface.

(a) Academic input. While characterized as mass knowledge production, the



role of educational credentials in CKG does periodically arise. Lying about academic credentials led to the Essay controversy, suggesting that academic credentials and/or integrity do matter in the community. Academic input provides additional support for cooperation rather than conflict between academia and CKG, because contributors to CKG can be academically trained at various levels and some may be at the top of their profession. CKG differs from academic knowledge generation as writing is orientated as a hobby rather than an activity for career advancement. The mobilization of academics in CKG contributes to legitimacy which CKG directly inherits from academia.

(b) Ideologically driven policies. Ideologies affect website policies, including personal websites, blogs and CKG projects in general, such that inappropriate materials can be removed and IP addresses and user accounts can be banned. Nevertheless there can be various levels of tolerance to, and sanctions against, soft advertising and propaganda. The deletion of the Wikipedia sub-community Esperanza<sup>1</sup>, because of its lack of transparency to the wider Wikipedia community, limits how this CKG project can simultaneously cater for personal and social interactions; its original aim does not. Website policies can contribute to legitimacy by the adherence to specific rules, such as neutral point of view, avoidance of conflicts of interest and verifiability, contributing to information accuracy.

Ideology also plays a role in the sustainability of CKG. Towards the end of the industrial age, the expansion of the commercial sector into information generation has led to efforts to further protection of the information giants. One of such increased protection involves the restriction of information flow, with both criminal and civil law used to protect intellectual property, and the lowering of requirements to attain intellectual property status, e.g. in patent licenses. This increasing restriction can hamper or halt the general operation of information collection and distribution in CKG. This also raises concerns on the legality of CKG.

(c) Legality. Following the expansion of the commercial and especially the financial sector, protection of the powerful strengthened, such that intellectual property giants were more influential for information policies than the powerless. This creates an ongoing crisis for CKG and its reliance on free flowing information. The legality of free information is also an ongoing topic in the free information community, spawning innovations such as the creative commons license. Wikipedia's move to license content under the creative commons helps clarify the once ambiguous status of its content. When violations occur, the commercial sector complains about intellectual property violations on websites, requiring the latter to remove the violating content, a form of post-censorship. The expanding intellectual property laws resulting from lobbyist efforts by the commercial sector are constantly at odds with CKG ideology and threaten its existence, hence mass CKG projects such as Wikipedia embark on a dual mission: purely knowledge-seeking and advocates

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<sup>1</sup>More information for Esperanza can be found at <http://en.wikipedia.org/wiki/Wikipedia:Esperanza>

for free information.

(d) User interface. The ongoing endeavor of CKG simultaneously provides both raw material (unreliable/unverified information) and product (knowledge), placing the burden of accuracy and relevance on users. Unreliable information incurs risks for the user. Website designs help alert users to potential problems with website content, for example, ‘intellectual health labels’ at the top of articles warn users of specific and potential problems with these articles. Another way to minimize user-side risks is through grading the content such as WikiTrust, a browser add-on which highlights potentially problematic words and sentences in Wikipedia articles, based on editing patterns.

CKG starts as free service, following the general culture of internet use. Its legitimacy constraint is thus loose when compared with the highly institutionalized academia which concerns academic integrity, and the competitive commercial sector which concerns brand-building. In any case, the use of free services is voluntary, and information acceptance is at the users’ risk. The exception is when contentious content incurs legal consequences. Now CKG has risen in popularity as an alternative to academic knowledge generation, a comparative analysis with academic institutions can single out the novelties of CKG and reflexively uncover assumptions of existing modes of knowledge generation.

## **Cooperative Knowledge and Society**

### *Cooperative vs. Academic Knowledge Generation*

The scale of the crowd enables mass CKG to emerge outside the academia and commercial sector. The ideology behind CKG, which enables its existence, is a culture of sharing which opposes the commercial sector in which activities are for profit. Hence CKG, which relies on the sharing doctrine, is entwined with a need for the advocacy for legality of sharing. The academia stands between the rivalry between sharing and restriction. On the one hand, academia was at odds with the commercial sector long before the emergence of CKG. Patents conflict with academic freedom, and there are controversies over conflict of interest with funding sources. On the other hand, the rise of academic patents and technological departments engaging in innovative businesses signals the merging of the academic and commercial sectors—the use of knowledge for profit-making.

The rise of CKG provides a reflexive opportunity to understand age-old and severely institutionalized academic knowledge generation. Now an alternative exists, a comparison with this taken-for-granted mode of knowledge generation is finally possible. Reflexivity is a common theme in sociology towards the late 20<sup>th</sup> century, with representative works including Bourdieu and Wacquant (1992), Beck (1992) and Beck, Giddens and Lash (1994). Nevertheless, instead of developing from academic schools of thought, this opportunity for reflexivity is spawned by the rise of CKG in this case, which has opened up due to societal, and in particular, technological changes. Consequently, it is

necessary for academia, in the study of CKG, to explore new theories and theoretical arguments which empirically account for this new social terrain.

Academic discussions and criticisms of CKG come from several camps. Firstly there are the skeptics, or conservatives of knowledge generation. Academics have criticized CKG for the lack of authorship and educational credentials necessary for knowledge generation, and the unreliability of content (Encyclopaedia Britannica 2006; for a survey of the debate see Reagle & Lessig, 2010:137-168). CKG is also seen as a potential threat to academia and as a decline of academic standards as the mass generates knowledge without first satisfying the requirement of academic training and qualification. However, before making criticisms based solely on its failure to meet certain criteria (while neglecting its advantages on cost) it is necessary to investigate the role of CKG as embedded in the social context of the 21<sup>st</sup> century because mass CKG and the academia provides different functions and have their own target audience. This distinction would help illuminate to the kind of knowledge CKG produces and why this has to emerge in the context of the dominance of both academic and commercial knowledge generation. Now that CKG challenges the foundations of academia, there is great opportunity to re-examine the necessary and sufficient conditions for knowledge generation.

The debate on Wikipedia vs. Britannica is one of the examples of online mass CKG vs. academic knowledge generation. The former provides a free service, while the later offers the first 100 words of articles for free, a 7-day free trial and US\$69.95 for unlimited annual access<sup>1</sup>. Sociology offers some research traditions to approach this phenomenon of price difference, one of which is the critical school: as a form of information inequality; the poor remain with unreliable information while better information is available for a fee. Alternately, by viewing the internet as a marketplace for information, users can choose their information from providers with different reliabilities acquired at different costs. The higher costs are supposedly related to higher added value, and in the context of knowledge use, information reliability. However, there are other dimensions regarding the merits of CKG and the academic and commercial sectors in terms of: content quality and quantity, scope, user participation, updating rate, social constraints, quality requirements and verifiability.

(a) Content quality. The article quality of both academic knowledge generation and CKG processes are close (Giles 2005). However, as an emerging phenomenon, CKG has to struggle for legitimacy. Moreover, now that content generation and content usage happens simultaneously, users have to decide whether to accept existing content or modify it. The legitimacy lag (Yam 2013) can be problematic, especially when false content creates reputation or safety issues. This includes non-academic information such as vandalism, advertising and propaganda. In hard advertising it is easy to identify non-academic information using features such as the tone and the self-pleasing actual content.

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<sup>1</sup>As of 20 Dec, 2012. See <http://www.britannica.com/> for details.

With the rise of social websites, soft advertising/propaganda has started to merge with the personal sphere. While CKG projects continuously eliminate non-academic information, the tools for prevention, detection and correction must constantly improve with the increasing improvement in techniques for non-academic contribution. Because these tools are not perfect, there is a legitimacy glass ceiling for cooperative information. Second, contentious information can threaten both the CKG project and its participants. Biographical content is a prime example of this. The subjects of these biographies can protest content and threatens to take legal action.

(b) Content quantity. The number of articles Wikipedia generates greatly surpasses Britannica. In fact, with the rise of personal websites, the blogosphere, newsgroup and institutionalized CKG efforts, the amount of mass information currently available has exploded since the early growth of the internet.

(c) Scope. The information CKG provides can have a different focus from the academia: CKG leans towards pop culture while academia has more coverage on the higher culture. CKG, as a reflexive project by and for the mass, generates services for its own users, hence its relevance to everyday life, the recent and the practical. While the academia has criticized CKG's ignorance on higher culture, the coverage on pop culture fills the knowledge void when academics only generated abstract, generalized knowledge and mass knowledge generation had not taken shape in the past.

The commercial sector has previously dominated the production of pop knowledge, or, entertainment. The conflict between corporations to capture audience attention drives knowledge production, following and implicitly consolidating trends of audience perception, hence operating as a conservative positive feedback mechanism. A number of intellectual restrictions have evolved to forbid others' use of knowledge, defining the scope in which the commercial sector can produce knowledge, while lobbyist efforts expand the scope both as corporations expanding their power over other corporations and also over non-commercial sectors. The additional power of lobbyist efforts expands information inequality between the commercial sector and the rest of the mass.

(d) User participation. CKG users can also become editors, hence deciding article content and also the scope of what Wikipedia should and can cover. Through participation in the CKG community, individuals also contribute to policy discussions and changes. As an emerging phenomenon, the future of CKG is largely undecided, currently following the interactions between CKG participants and users, intellectual property stakeholders and lobbying efforts, and governments. Participating in policy decisions empowers the participants involved.

(e) Updating rate. Wikipedia content is quickly updated and changes are instantly visible. With the strength of instant updates, the power of CKG can provide local and real time information in addition to generalized knowledge, again reinforcing the distinction between mass and academic knowledge generation.

(f) Quality requirements. Academic knowledge generation has strict controls on who qualifies to participate and what qualifies as knowledge. Quality control on personnel takes the form of education and qualification examinations, while the quality control of knowledge is achieved through refereed journals, conferences and books. This determines what qualifies as knowledge through ‘filter then publish’ (Shirky 2008). In contrast, CKG emerges from volunteer contributions, and with real-time updating it is hard to establish quality requirements. Normally, vandalism has to be cleaned up afterwards, although the scale of the crowd helps with both its detection and correction. Sanctions against suspicious user accounts and IP addresses are possible ways to combat vandalism but compromise the free contribution environment.

(g) Verifiability. The legitimacy of new cooperative knowledge comes from citation of reliable sources from both the academia (academics, journals) and commercial sectors (media reports). External verification of factual content requires CKG to rely on existing knowledge. The authority of existing knowledge from reliable sources supplements the textual validity often resorted to by CKG. This would mean that CKG still have to rely on the legitimacy of content generated by existing modes of knowledge generation at least in its initial phase.

Following the advancement of knowledge production by the contributions of technological enablers to successful websites, the study of the emergence of CKG as an alternative knowledge approach brings the spotlight to academia once again, forcing it into reflexivity. These technological enablers extend what previous technology could not provide: the internet, with its digital transmission, software and interface design which allows easy access, convenient experience and the design for both content and discussion forums for content generation.

### *Incremental Knowledge*

The absence of clear boundaries which define membership separates CKG from its academically institutional counterpart. As large amounts of time and energy are not necessary to gain membership, CKG projects exhibit great mobility.

The ever increasing exchange of information due to the rise of the internet and mass culture has led to a number of pessimistic and critical schools. These include the postmodernist rhetoric, stratification studies for expansion of inequality with DiMaggio’s digital divide, the spread of economic inequality as in world system theory, and the globalization of religious, political and racial conflict. The potential of CKG provides another side of the story. The rise of the crowd, as well as ‘massification’, was greatly enhanced in the age of information technology, starting around the 1990s. Now that massive voluntary projects are possible, CKG projects are capable of utilizing peoples’ residue time and energy in the form of hobbies. A small number of dedicated volunteers exist (Yam 2013), but the majority of the crowd gives small continuous contributions, incrementally building up knowledge in the

cooperative knowledge repertoire. Yet the proportion of each kind of knowledge in the repertoire is very different from that of academic libraries or encyclopedias. As the repertoire is built by the mass, it has more coverage on the pop, the concrete and the readily useful.

Each increment in the repertoire represents a change in the overall knowledge of society. Naturally, retrieval from the repertoire is what initially attracts information-seeking users, while incentives for contribution transform users into editors. Contribution to the repertoire takes the form of content creation, modification or deletion. Decisions on the acceptance of contribution necessitate dispute resolution. The institutionalization of CKG creates social processes for each of these contributions.

The possibility of building a cooperative knowledge repertoire hinges on developments which lead to enablers and constraints in these three realms: technology, personality and society. Technological enablers encompass the use of physical systems, software innovations and human-computer interaction designs. Technology also sets limits to CKG projects due to physical laws and the development status of systems for prevention, detection and correction of non-academic contributions, supporting anonymity, and censorship (which discourages contributions). Personality enablers stem from the nature of humanity: willingness for delayed reciprocity and hobbies, and ambivalence towards the sacrifice of small amounts of time and energy for incremental contributions to the repertoire. Free riding plagues massive sharing and CKG in general. While academic institutions have long traditions with a relatively well-established boundary which safeguards its academic freedom, CKG undergoes constant policy changes and has to react to public demands and controversies. Nevertheless, both CKG and the academia are facing threats and opportunities from wider society, and competition with and contribution from the commercial sector. Societal enablers and constraints encompass cultures and ways of handling conflicts which pre-exist the age of information technology but continue to define CKG developments. While openness to new information and a generally educated public enhances CKG formation, expanding intellectual property laws due to rising political influence of the commercial sector, with its interest in commodification of information and knowledge, can threaten the existence of CKG, together with censorship in the name of societal needs banning materials culturally defined as inappropriate. This implies a constant need for CKG to interact with wider society, explaining itself, demonstrating its utility, and participating in the dispute between freedom and restriction.

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