Analysis of Cultural Differences in Collaborative Innovation Networks: Wikipedia

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ABSTRACT

This paper aims to observe the cultural differences in collaborative innovation networks by comparing the statistics that belong to different versions of Wikipedia websites in English, German, Japanese, Korean, Finnish and Turkish languages. For this purpose, data provided by Wikipedia is used. Relying on this data, the prevalence of Wikipedia was evaluated by examining contribution rates to Wikipedia dependent on population in different languages. In addition, the hierarchy of the social structure formed during article creation on Wikipedia was evaluated by looking at figures such as the number of active users and admins. Here, Wikipedia is used as a microscope to analyze the cultural structure and the transition process of different local cultures into information technologies. This study is a step toward having a better understanding of different cultures by analyzing editors' behavior based on the assumption that the editing behavior and co-operation models are influenced by their own cultures in the real world.

Keywords: *Wikipedia, Collaborative Innovation Networks, Online Culture, Web 2.0*
JEL Classification: *O3, 035, M15, L86*

İşbirlikçi İnovasyon Ağlarındaki Kültürel Farklılıkların Analizi: Wikipedia Örneği

ÖZ

Bu bildiri, İngilizce, Almanca, Japonca, Korece, Fince ve Türkçe dillerindeki Wikipedia'ları karşılaştırarak işbirlikçi inovasyon ağlarındaki kültürel farklılıkları gözlemlemeyi amaçlar. Bu amaca yönelik olarak Wikipedia'nın sağladığı bazı veriler kullanılmıştır. Bu veriler sayesinde farklı dillerdeki nüfusa bağımlı Wikipedia'ya katkı oranları incelenerek Wikipedia'nın kullanım yoğunluğu değerlendirildi. Ayrıca aktif kullanıcı ve admin(yönetici) sayısı gibi rakamlara bakılarak Wikipedia üzerinde madde oluşturma sırasında oluşan sosyal yapının hiyerarşisi değerlendirildi. Böylece Wikipedia, farklı yerel kültürlerin bilgi teknolojilerine geçiş süreci ve kültürel yapısını analiz etmeye yarayan bir mikroskop görevi görmüş oldu. Bütün dillerdeki Wikipedia'ların temelde aynı prensipleri ve amaçları esas aldığı varsayıldığında, bu çalışma; editörlerin, gerçek dünyada sahip oldukları kendi kültürlerinin etkisindeki işbirliği modellerine bağımlı davranışları hakkında bilgi sahibi olmaya yönelik bir adımdır. Bu yaklaşım, editörlerin Wikipedia maddesi oluşturma sürecinde, gerçek dünyadaki kültürel normlarını ve işbirliği şekillerini yansıttıkları önermesine dayanır.

Anahtar Kelimeler: *Wikipedia, İşbirlikçi İnovasyon Ağları, Çevrimiçi Kültür, Web 2.0*
JEL Sınıflandırması *O3, 035, M15, L86*

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(Makale Gönderim Tarihi 14.05.2019 / Yayına Kabul Tarihi: 14.08.2019)
Doi Number: 10.18657/yonveek.565210

1. INTRODUCTION

Technology is designed by scientists and engineers and made available for people to use. But what really matters is, how people use and understand that technology. Here, we see a close relationship between technology and the human factor. Technology is produced out of people's needs. However, the people who make use of that technology shape it according to their needs. At the World Information Summit held at the end of 2003, Kofi Annan, the 7th Secretary-General of the United Nations, said, "While technology shapes the future, it is people who shape technology and decide to what uses it can and should be put. (Annan, 2003)" Therefore, in this study, rather than the effect of technology on humans, the effect of humans on technology will be evaluated. Specifically, this study aims to investigate how different cultures of different societies affect the way of using the same technology and the kind of changes of use that the culture causes. So the main focus is the human element or a community. In other words, this paper aims to see the influence of culture on the interaction between human/culture and technology.

Here, what we mean by technology is information technology. Analyzing the social aspect of information technology is more difficult compared to its technical aspect for, unlike social studies, in technical studies, it is more likely to see technical parameters as numerical values and produce an objective study.

For example, a country's investment in technological infrastructure in the utilization of information technology is a measurable value. However, it is more difficult to measure the influence of information technologies on the culture of a country, or from the opposite perspective, to measure the effect of people's culture on the use of technology. This study aims to make this complex analysis. In order to achieve this, we will rely on some of the data provided by developing information technologies.

The new internet technology, or web 2.0, that had developed from being a static interface to an interactive platform that enables users to create and share content, the internet has enriched. Ultimately, anybody can generate, share and use any information and data. With this revolutionary feature, information technology has quickly become more prominent throughout the world and effectively used by societies which have different cultures and level of technological development (Castells, M., 2010). This has created multinational and online business models by accelerating globalization and virtualization around the world. As a result, collaborative systems such as collaborative software, cloud systems, computer-supported cooperative work, virtual work environments, and collective intelligence have emerged that reformed both the business world and social networks (Faraj S, Jarvenpaa SL, Majchrzak A., 2011).

Nowadays, we see that information itself and its technologies are being used more effectively both in business life and in social life all around the world. Turkey, which is among the developing countries, is in the process of

rapid adaptation. Internet use in Turkey is increasing rapidly. Today, 93.7 percent of Turkey's population has access to the internet (TurkStat, 2016). It is also possible to observe a rapid parallel increase in the use of social media. While a virtual Turkey is emerging, similar and parallel processes exist in all countries. Thus, the world is becoming flat (Friedman TL, 2005). These developments together provide the right amount of data which can be used in social and cultural research, and give us the ability to compare cultures with each other.

Developing countries, such as Turkey, experience a transition process from an agricultural and industrial society to an information society. This transition process may be measured by using sociological, cultural, economic or technical parameters that come out of the change and transformation in the country. When a country's transition to the information society is considered as a social transformation, this process can be examined through social parameters (Bilgi toplumuna dönüşüm, 2016).

This study tries to explore the existence of a connection between the use of information technologies and culture. This research relies on the hypothesis that, differences in cultures cause differences in the use of the same technology. Two phenomena will be examined here. First one is the comparison of different nations' "prevalence of use" of the same information technology. This parameter will be regarded as a value, showing the transition of a nation to the information society. The second is the hierarchical pattern of the social structure that forms in the use of information technologies. In this case, it will be analyzed if a correlation can be made between a society's social structure in the real world and the social structure that forms in the digital world. The information that will support such research will also be obtained through online collaborative networks.

METHOD

Previous researches on online culture have been based on offline culture. All of these studies have taken cultural dimensions from Hofstede or neglected different and independent cultural articles and have benefited from survey studies without analyzing the culture. The main difficulty in such studies is the reliance on biased expressions based on personalized questionnaires. In this context, Hofstede says: "It is clear the assessment of personality traits and their associations with features of culture need to supplement self-reports with alternative methods. (Hofstede G, McCrae RR, 2004)" Here are the key questions:

- Research Question 1: Can we evaluate culture directly on the internet?
- Research question 2: Is online culture universal? Are there similarities and differences between national online cultures?
- Research Question 3: What kind of information can we obtain about the cultures of different countries when they are compared through online collaborative networks?

Online dictionaries and encyclopedias have turned into various sources of information about any topic. Working principles and editing styles may vary depending on the language in the encyclopedias that are designed as open-source and free which allows every internet user to make changes and additions regardless of any merit or qualification. In this research, Wikipedia will be the subject matter as it being the most popular and widely used open-source online encyclopedias in the world.

Wikipedia is reported to be the top reference in educational resources in the United States. This also applies to many languages (Tancer, B., 2007). This site defines itself as "online free encyclopedia". Here, "free" means both having no fees and giving everyone the ability to make changes to the content without any restrictions. This flexibility of contribution that is anybody of any age and any social class can contribute designates homogeneity. Having this structure, Wikipedia can present a level of data that may become the subject to academic research on the culture of people (Castells, M., 2010).

Wikipedia has been chosen as the subject matter of the research mentioned above. Considering Wikipedia as a social network that serves in different languages, the impact of cultural differences will be examined.

A similar set of research has been conducted under the leadership of Peter A. Gloor, a research scientist at the Center of Collective Intelligence at Massachusetts Institute of Technology (MIT). Their research was conducted in English, German, Japanese, Korean, and Finnish languages (Park, S. J., Kim, J. W., Lee, H. J., Park, H., Han, D., & Gloor, P., 2015) (Nemoto, K., & Gloor, P. A., 2011). In that study, cultural dimensions are explored and postulated in order to explore online culture from behavioral patterns derived from the combination of structural and behavioral measures as follows: collectivism versus individualism, extraversion versus introversion, boldness versus deliberation, and egalitarianism versus inegalitarianism.

Here this study will follow a similar pattern with similar tools and statistics in different languages including Turkish. Also, another parameter will be analyzed. That is the prevalence of Wikipedia among the general population.

Questions and Hypotheses

Wikipedia is a typical online collaboration site where individuals contribute and collaborate on a voluntary basis to effectively produce an online encyclopedia (Giles G., 2005). In this sense, the online behavior of people can be observed by examining the behavior of editing that indicates how people work and collaborate. Online or cyber behavior and culture may be universal, and it may also differ depending on the language and culture. In this study, editing behaviors will be examined to observe the universality and particularity of online cultures.

As mentioned earlier, Wikipedia is preferred here because it is a unique collective intelligence site based on voluntary collaboration. Another factor is its homogeneity because people from all walks of life can contribute without

limitation which provides an extensive database making it a valid source of information for research.

In online collaboration, there is the opportunity to see culture most naturally and simply, as it is based on voluntarism exempt of the dynamics and constraints of concrete organizational and administrative power. In this way, traces of different personality types can be observed.

When viewed in the context of static web 1.0, Wikipedia is a content site that provides an encyclopedic, unbiased and descriptive source of information on any given subject. Given the web 2.0 mentality that Tim O'Reilly has described, Wikipedia is a virtual and social platform built on the internet to allow people with knowledge of a particular subject to share this knowledge they have on behalf of others for the benefit of others. For an ontological approach to the definition of Wikipedia, it can be said that Wikipedia is a reflection or the outcome of a fundamental human need that is to seek knowledge or in other words to collaborate and to make that knowledge available for people to search. In this regard, Wikipedia's level of development on a language can be correlated with how much people that speak that language have those instincts or were able to get organized to satisfy this need.

We can build another hypothesis on the latter definition of Wikipedia above. That is, when we examine it in regards to the definition of a social platform, different behavioral constructs arise in the process of collaboration among the contributors who are aiming to produce particular information. This research is based on the assumption that these online behavioral constructs reflect the cultures in the real world.

It is generally said that the cooperative processes differ in Western and Eastern societies. For example, Western nations are said to be more individualistic, although East nations are more collaborative (Hofstede, 2005). The Japanese, for example, communicate with each other in order to prevent a possible conflict before they create a jointly shared content (Obuchi and Takahashi 1994). On the other hand, there is strong leadership in Western cultures and a clear way of resolving the conflict. In this study, it will be examined whether this cultural difference emerges in online collaborations. Another assumption that will be made here is that different co-operative cultures influence the growth rate and pace of Wikipedia.

FINDINGS

In this study, we will try to have some information about the people speaking the given language by analyzing some data with the statistical tools provided by Wikipedia. The statistical data includes some numbers like the number of articles, the number of edits and the number of users. These numbers will be analyzed in proportion to the population that speaks targeted languages.

In addition, the number of administrators (admin) and the number of active users will be compared, and the results about the hierarchical structure in these languages will be examined. English, German, Japanese, Finnish, Korean and Turkish languages will be studied.

The first analysis will aim to observe the prevalence of Wikipedia in different languages.

Prevalence of Use

Wikipedia is a free, independent, non-profit internet encyclopedia that is prepared in many languages jointly by users. Today, Wikipedia offers 267 different languages (that has min 100 articles). It contains over 1 million articles in 13 languages. Anyone with an internet connection can provide these contents. Registration is not necessary. However, this system also offers a login option to become a registered member. Members can log in to the system with a user name and a password. When a change is made to any article or object, Wikipedia adds it directly and makes it accessible instantaneously.

English Wikipedia contains 5,311,495 articles, and an average of 800 new articles are added to the list each day. In Turkish Wikipedia, there are 287,689 articles. The number of articles in English Wikipedia is 20 times larger than Turkish.

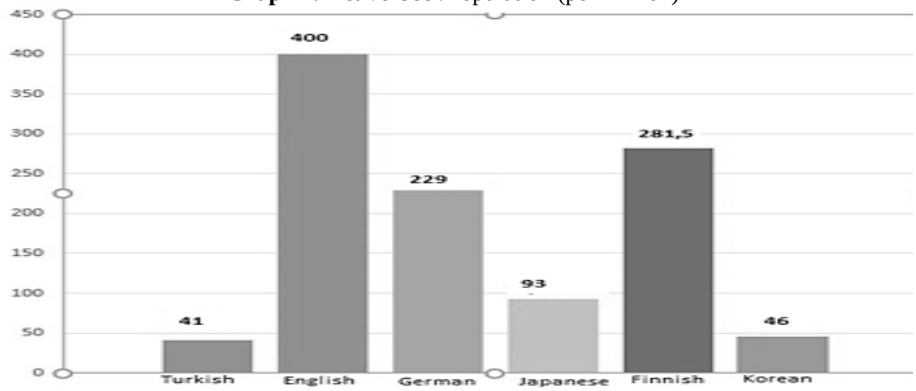
Here, the number of articles, the number of active users and the population that speaks the given language are evaluated. For English and Finnish, the number of people that speaks these languages that may reside in different countries has been summed while for Turkish, German, Korean and Japanese the population that resides only in their homelands is considered.

Table 1. Descriptive Statistics

	Turkish	**English**	**German**	**Japanese**	**Finnish**	**Korean**
Article	287689	5311495	2011078	1042204	405461	367542
Active User	3074	127176	18761	11842	1520	2344
Population (per million)	75	318	82	127	5.4	50.8
Article/ Population (per 10,000)	38	167	245	82	751	72.35
Active User/ Population (per million)	41	400	229	93	281.5	46

Table 1 gives the number of articles written in each language. There are over 5 million articles in English. In contrast, there are about 300.000 articles in Turkish. An immense difference appears between English and Turkish in the number of articles. It is partially due to the difference in the population speaking these languages. Therefore the population figures are taken into consideration and added to the table. Besides, the number of articles is given in proportion the number of speakers of that language. These ratios may suggest some information to evaluate the capacities of different cultures to produce knowledge in their native language. The most interesting conclusion that can be made here is that in Finnish, very high productivity is seen compared to other languages. Although Finnish is spoken only by one-tenth of Turkish, Finnish has twice as many articles in Wikipedia. It may be suitable to relate this difference to the welfare of the two countries.

Graph 1. Active User/Population (per million)



Another data on this table is the number of active users. The active user is someone who has made changes to Wikipedia in the past month. The ratio of the number of active users to the population can also show how much interest Wikipedia has in that particular language since the number of people who are willing to contribute every month indicates that interest.

In Graph 1, the ratio of active users to the population in six different languages is seen. For example, while 400 out of million people become active users in English, 93 out of million people become an active user in Japanese. In other words, compared to the Japanese the number of people who produce content is four times more in English. In Turkish, this number is 41 out of 1 million. This is half of Japanese and one-tenth of English. Each number on this chart deserves further evaluation and analysis.

Hierarchical Structure

Admins are users who can make changes to articles like everyone else. They have their own user page. Also, they check the content of articles and evaluate if the content is in line with the Wikipedia guidelines. They also evaluate the neutrality of the written material. Besides, they can block the editing rights of some users or anonymous editors (IP number), remove the block, use some special tools that not everybody has access to, and have some other similar administrative proprietary rights. Admins are volunteers. They do not receive any salary from Wikipedia. They cannot use those privileges and executive tools in order to gain superiority over discussions.

Table 2. Descriptive Statistics

	Turkish	English	German	Japanese	Finnish	Korean
Article	287689	5311495	2011078	1042204	405461	367542
Pages	1465343	41025094	5770730	3040551	1097002	1387715
User	924808	29796524	2543225	1159604	332627	432676
Active User	3074	127176	18761	11842	1520	2344
Admin	27	1273	199	48	39	33
Edit	18913117	864993830	165674537	63339847	16964584	19705611
Edit/Page	12.91	21	28	20	15	14
Admin/Active User(%)	0.88	0.1	0.1	0.4	2.5	1.4

In the table above, we see the number of admin per active user. English Wikipedia has 29,796,524 users 127,176 of which are active users. 1273 of these users have admin rights. In Turkish, the number of users is 924,483 and 3074 of which are active users. The number of admins is 27. While the ratio of active/active users in English is approximately 1%, this ratio is approximately 0.88% in Turkish.

The higher number of admins per active users means that more active users are becoming admins. Therefore more people have special administrative rights. This means that it is a less hierarchical structure. To have a closer look at these figures, see the graph below,

Graph 2. Admin/Active User Ratio

Here, Finnish has the least hierarchical structure with a significant difference as 2.5 percent of the users are admins. In the previous analysis, we have seen that the Finnish language was also far ahead of other languages in the number of articles written per population. It can be a right approach to ascribe this high productivity rate to its hierarchical structure. Therefore, we can say that productivity increases with decreasing hierarchy.

We see that the same ratio is 1 percent in German and English languages, which is an average value within six languages. It is also seen that Turkish is 0.88% and is slightly more hierarchical than German and English. The language that has the most hierarchical structure appears to be Japanese. According to the hypothesis and the analysis, it is possible to assert that the hierarchical structure of Japanese, an Asian language, is parallel to the culture of that country.

DISCUSSION AND CONCLUSION

In this study, we looked at some statistical data on Wikipedia in six different languages. These data were given in proportioned numbers to be able to make reliable comparisons and establish relationships with corresponding cultures. Here two key ratios were the subject of research. One observes the proportion of created articles and active users to the population to evaluate the prevalence of use of Wikipedia in given languages. Considering Wikipedia as a reflection of a nation's need for knowledge, urge to share knowledge or to collaborate to produce that knowledge within a systematic and organized way, the prevalence or intensity of its use is accepted as an expression of a transition towards information society.

The other rate to be investigated was the number of admin users to the number of active users. By comparing these ratios on these six languages, a conclusion was drawn about the hierarchical structure of Wikipedia in these languages. A correlation between the online culture that is discovered on Wikipedia and the real-world culture of the people speaking that language was acknowledged. Thus, the more hierarchical Asian or Eastern cultures were reflected in the Wikipedias of those languages. On the other hand, the Wikipedias in the Western languages reflect the Western cultures which are more egalitarian.

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