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East Asian Communication Technology Use and Cultural Values

James A. Danowski and Han Woo Park [1]

This study examines media used for information in the East Asian countries of China, Japan, South Korea, Taiwan, and Singapore, using data from the World Values Survey. The sharing of Confucian culture may lead to a uniform media structure across these nations. Another possibility is technological determinism, which would also lead to similarity across nations. However, it is possible that countries are at different stages of technology development and will eventually become more similar. An opposing notion is that differences in other values among nations predict digital media use. To examine the evidence considering these possibilities, we factor analyze each population's use of nine traditional and digital media to see how similar the structures are. What results is a three-dimensional solution for four out of five countries, except Singapore, which has a more simple two-dimensional structure. Analysts regard Singapore as the most digitally connected society, which raises the question as to whether it is higher on a technological development trajectory, to which other countries may transition. Perhaps a more simple media use structure is an adaptation to increasing information load. As well, as mobile devices have become a primary means of accessing the range of traditional and social media, it may have an expanded role in reducing media channel entropy. In terms of frequency of media use, Singapore is highest, while China is the lowest. Singapore stands out in high mobile use, and China for low Internet use. There appear to be developmental differences across the nations. Regressions on Internet use for 18 values indices find different values predictors in the East Asian countries, ruling out Confucianism as producing similar media patterns.

Keywords: Eastern Asia, cultural values, communication technologies

[1] James Danowski, Department of Communication, University of Illinois at Chicago (jdanowski@gmail.com). Han Woo Park, YeungNam University, Republic of Korea

Introduction

Although scholars have widely studied cultural values (Hofstede, 1983; Inglehart & Welzel, 2010), they have not examined the relations with media dimensions, the patterns that underly media usage. This paper focuses on cultural values and the structures of media use in five East Asian countries: China, Japan, South Korea, Singapore, and Taiwan. Our primary interest is in whether media use across these countries is similar or varies, and why this may be the case. If the countries have similar media dimensions, perhaps the shared cultural values of Confucianism (Yao & Yao, 2000) accounts for this. Another possibility is that the media's technological structures and processes may override culture, producing a technological determinism effect (Chandler, 1995), contrasted with social constructivism (Chandler, 2012). On the other hand, if there were differences in cultural values, other social processes besides shared culture or technological variables may be involved.

Differences in media patterns may result from countries being at different developmental stages in the diffusion of media. As well, there may be differences in the social construction of the media organizations, and how they manage the media within varying systems of regulation and resources. Besides developmental and institutionalization factors, media content differences across the countries may produce differences in exposure patterns. This research investigates these possibilities, first seeing whether East Asian countries' media use patterns are similar or different. Then we consider some possible explanations and directions for future research. In the next section, we detail our conceptual definitions, followed by descriptions of the data and variables, the analysis process, results, and discussion of the implications and suggestions for further research.

Confucianism.

Arguing in favor of uniform patterns of values due to shared culture across these countries, scholars of culture and communication treat all five as sharing the Confucian culture: China, Japan, South Korea, Taiwan, and Singapore (Yum, 1988; Hofstede & Bond, 1988; Bond, 1996; Zhang, Lin, Nonaka, & Beom, 2005). As well, Inglehart & Welzel (2005) classify these societies as Confucian, based on empirical results from clustering more than 100 values items across nations of the world.

On the other hand, it is also possible that these nations vary in the interaction between their cultural values and the content of media, resulting in differences in their media use profiles. This values/content linkage would add a third explanatory model to that of technological effects and cultural cohort effects at a lower level of abstraction than Confucian culture. Examples of such Meso-level relationships include those of Lee & Tkach-Kawasaki (2018) and Guo, Liu, Ding, Hu, Zhen, Liu, & Jiang (2018).

Technological Determinism vs. Social Constructivism.

Technological determinism is a term coined by Veblen (1899) to refer to the effects of the technology on societal processes, distinguishing a dichotomy of "institutional" and "technological" effects. Some scholars consider Karl Marx's (1890) thesis that the means of production determine

social and economic relations, as a technologically deterministic one, but others have argued that the social relationships, not technology, are primary in his treatment (Bimber, 1990). McLuhan (1964) offers a technological determinism conception in his notion that the medium is the message, in other words, that the nature of the technology shapes the content and its effects. Technological determinism notions are pervasive in contemporary society (Wyatt, 2008). It is common to think that the affordances of technology (Gibson, 1977) structure people's use of it. For example, there is widespread thinking that social media have led to significant changes in media use patterns.

A concept that counters technological determinism is social determinism, that media systems are socially constructed, as well as their effects being structured by social and psychological processes (Chandler, 2012). Such a socio-technical concept prevails in studies of information and communication technologies (ICT) in organizations and may generalize to higher-order systems such as nations. In our analysis, if the five East Asian nations operate as a group influenced by Confucian values, this would define a social driver of technology effects, a *cultural cohort effect*. Another social factor is variations in nation-specific values, which we label a *values* effect. We examine whether there are differences in values across countries to see whether we can rule out Confucianism or technological determinism as explanations for similarities in media use that we may observe.

Although this study can shed light on whether values are important in structuring media use profiles relative to Confucianism and technological determinism, our secondary analysis of the World Values Survey (WVS) data limits our testing of hypotheses about why particular values effects may occur. So, future research would develop theory and test hypotheses about why different values may be associated with media exposure patterns. Another avenue for theory development is the exploration of differences in the content of media across the countries. These would account for another kind of social effect, a secular or period effect, which media agenda-setting theory would support.

Developmental Differences.

Societies are likely to have different levels of development for communication technologies. Some societies adopt new technologies more quickly than others and vary in their subsequent growth curves. Differences in governance create country-specific policies and procedures for licensing, regulating, and funding. As well, there are differences in penetration among the media across subgroups of the populations. The production of media content also varies across countries, including differences in traditional as well as social media and perhaps in their relative effects on individual and social behaviors.

The analysis to follow will enable assessment of the three competing theoretical arguments: 1) the social effects of Confucianism, 2) technological determinism, and 3) processes of development. By assembling available data on cultural values from the World Values Survey and on penetration of the ICT technologies in terms of use per capita, we can provide empirical evidence that helps sort out these sources of effects on observed media use patterns.

Methods

World Values Survey.

Our analysis is both facilitated and limited by an available source of data, the World Values Survey (Inglehart, Haerpfer, Moreno, Welzel, Kizilova, Diez-Medrano, Lagos, Norris, Ponarin, & Puranen, et al., 2014). Hofstede (2011), whose work is a milestone in the analysis of cultures, states that were he now doing the kind of research he did in 1970, instead of gathering data as he did, he would analyze the WVS data.

WVS uses a common questionnaire with several hundred items across more than 100 countries from 1981 to 2014, in six waves administered approximately every ten years, including interviews with nearly 400,000 respondents. Central to the research is the measurement of values in politics, economic life, religion, gender roles, family norms, and sexual norms.

Our focus is on a set of items measuring media use for information to values for five East Asian countries in Wave 6, collected from 2010-2013: China, Japan, South Korea, Singapore, and Taiwan. This wave was the only one to include the media variables of the Internet and email, precluding analysis of change over time.

Benchmark Data.

The available data from 2010-2013 are from a pivotal technological period with the launch of many social media. The measures of Internet, email, mobile phone, and computer use covers the primary digital media of that time, along with traditional media. This period's media provides a benchmark to use in future research that evaluates the effects of social media on the dimensionality of media in these countries. With the next wave of WVS soon to be released, we can compare the 2010-2013 data to that for 2019-2020, because it directly measures social media. As new data are available, its format is consistent with earlier waves, enabling analysis over time. The WVS is now planned for administration every five years, so adding the 2025 data will provide three points in time to identify curves.

In addition to its benchmark and historical value, this research reveals new information about traditional and Internet-based media at the beginning of social media's early adopter phase. This analysis makes additional contributions through its examination of the links between societal values and media use patterns. Cultural values (Hofstede, 1983) have been predictive of organizational behavior and many social-psychological constructs, including cross-cultural communication. Nevertheless, values have not yet been studied in relation to media dimensions with representative samples of societies, as we do here.

Media Use for Information.

There are nine media use variables in the Wave 6 World Values Survey. The question read to respondents was:

People learn what is going on in this country and the world from various sources. For each of the following sources, please indicate whether you use it to obtain information daily, weekly, monthly, less than monthly or never (*read out and code one answer for each*):

	Daily	Weekly	Monthly	Less than monthly	Never
V217. Daily newspaper	1	2	3	4	5
V218. Printed magazines	1	2	3	4	5
V219. TV news	1	2	3	4	5
V220. Radio news	1	2	3	4	5
V221. Mobile phone	1	2	3	4	5
V222. Email	1	2	3	4	5
V223. Internet	1	2	3	4	5
V224. Talk with friends or colleagues	1	2	3	4	5

V225. How often, if ever, do you use a personal computer? (Read out and code one answer):

1 Never

2 Occasionally

3 Frequently

We consider three kinds of analysis in examining the similarity of media use spaces. One method is principal components analysis, as implemented in factor analysis. If the factor structures are highly similar, this indicates support for the cultural cohort effects of Confucianism or technological determinism. If we find differences, neither of these explanations will hold.

Second, we scale the similarities of the countries based on communication technology penetration for telecommunications, the Internet, and broadband using Multidimensional Scaling

(MDS). The MDS result helps visualize similarities and differences among the countries in media use. Third, we use regression to identify whether there are differences in values predictors of media use.

Results

Descriptive Statistics.

Table 1 shows the descriptive statistics for the media use variables. Singapore has the highest media use overall, and China the lowest. In terms of population uniformity, the standard deviations show that Japan has the lowest variation, and Taiwan the highest. However, in absolute terms, the countries are quite similar.

Table 1. Descriptive Statistics for Media Variables by Country

	PAPERS	MAGS	TV	RADIO	TALK	INTERNET	EMAIL	MOBILE	PC	AVERAGE
CHINA										
Mean	3.59	4.09	1.46	4.03	3.01	3.71	4.3	3.37	1.49	3.23
SD	1.6	1.29	0.96	1.47	1.64	1.66	1.29	1.76	0.88	1.39
TAIWAN										
Mean	2.31	3.44	1.22	3.05	2.65	2.67	3.33	3	2.1	2.64
SD	1.51	1.23	0.71	1.64	1.47	1.84	1.75	1.87	0.91	1.44
JAPAN										
Mean	1.61	3.3	1.1	3.12	2.04	2.99	3.5	3.22	2.03	2.55
SD	1.23	1.18	0.48	1.71	1.2	1.79	1.71	1.77	0.85	1.32
S. KOREA										
Mean	2.72	3.61	1.32	2.78	1.91	2.41	3.12	2.49	2.23	2.51
SD	1.58	1.23	0.81	1.57	1.18	1.7	1.7	1.72	0.85	1.37
SINGAPORE										
Mean	1.61	3.14	1.51	2.43	1.97	2.52	2.93	2.55	2.22	2.32
SD	1.07	1.38	0.97	1.48	1.23	1.71	1.73	1.72	0.89	1.35

Factor Analysis of Media.

To identify the configurations of the media spaces for each country, we factor analyzed the nine media variables to reduce the data to principal components. We did a varimax rotation to optimize loadings across them. In four out of five cases, there was a three-component solution. The exception was Singapore, which had a less complex two-component pattern. Aside from this structural configuration, there is considerable variation across countries in what media load on what dimensions. Table 2 shows the factor structure and composition for each nation.

Table 2. Media Components by Country

	Component		
Japan	**1**	**2**	**3**
Mobile phone	0.77	0.08	0
Email	0.71	0.31	-0.02
Talk	0.67	-0.04	0.06
Print magazines	0.18	0.08	0.12
PC	0.05	-0.86	0.06
Internet	0.23	0.81	-0.01
Daily newspaper	0.01	-0.09	0.72
TV news	0.02	0.01	0.7
Radio news	0.14	0	0.49
China			
Internet	0.8	0.1	0.01
PC	-0.71	-0.09	0.16
Mobile phone	0.68	0.07	0.24
Email	0.61	0.15	0.14
Daily newspaper	0.1	0.8	0.05
Print magazines	0.12	0.79	-0.05
Radio news	0.08	0.49	0.21
TV news	-0.09	0.16	0.83
Talk	0.37	0.01	0.53
Taiwan			
Internet	0.84	-0.01	0.07
PC	-0.76	0.15	-0.12
Email	0.75	0.07	0.06
Mobile phone	0.53	0.44	-0.05
TV news	-0.08	0.63	0.13
Talk	0.21	0.63	-0.2
Radio news	-0.06	0.45	0.14
Daily newspaper	0	0.22	0.76
Print magazines	0.17	-0.06	0.65
South Korea			
PC	-0.82	0.16	-0.13
Internet	0.81	0.16	0.03
Email	0.58	0.44	0.07

Mobile phone	0.25	0.7	0.09
TV news	-0.16	0.64	0.03
Talk	0.27	0.54	-0.09
Radio news	-0.01	0.51	0.22
Daily newspaper	-0.01	0.14	0.79
Print magazines	0.15	0.02	0.74

Singapore

Internet	0.83	0.05
Email	0.81	0.11
Mobile phone	0.71	0.16
PC	-0.64	0.16
Talk	0.48	0.29
TV news	-0.07	0.73
Radio news	0.16	0.64
Daily newspaper	-0.02	0.62
Print magazines	0.17	0.51

- **Japan's** media space includes a first dimension of mobile phone, email, and talking with friends or colleagues. PC and Internet load on factor 2, while newspapers, TV news, and radio comprise factor 3. Magazines do not load strongly on any factor.
- **China's** first dimension has mobile phone, Internet, PC, and email loading on it. Newspapers, magazines, and radio constitute factor 2, while TV news and talk with friends or colleagues load on factor 3.
- **Taiwan** has email, PC, and Internet loading on factor 1, while TV news, radio news, and talk with friends or colleagues load on factor 2, and newspapers and magazines load on factor 3. Mobile evenly splits between factors 1 and 2.
- **South Korea**'s first factor is PC, Internet, and email, while factor 2 is mobile phone, TV news, radio news, and talk with friends or colleagues, and factor 3 is newspapers and magazines. There is a differentiation of the electronic text media of PCs, the Internet, and email from media that have speech: ordinary talk, mobile communication, radio news, and TV news.
- **Singapore** has Internet, email, PC, and mobile phone loading on its first factor while the remaining media load on the second factor. There is no third factor in the solution. Talk with friends or colleagues loads on both factors. The deviation of Singapore from the three-factor solutions for the other countries in having only two factors merits further analysis.

In interpreting the factor analysis results for the five countries, in light of our competing explanations of technological determinism or cultural cohort effects, versus local values

differences in shaping media use in a society, we so far see a mixed picture. There are possible developmental processes at work, with different countries, perhaps at different stages of a common trajectory. At the same time, there is a consistent grouping of digital media technologies across countries.

Communication Technology Infrastructure.

The penetration of the Internet has increased 7-fold from 6.73% of the world population in 2000 to 49.72% in 2020 (https://data.worldbank.org/indicator/IT.NET.USER.ZS). We can consider the relative development of the communication technology infrastructure for our countries of interest. Table 3 shows data on telecommunications, the Internet, and broadband for 2016 for the five countries. We extracted these data from the World Factbook (https://www.cia.gov/library/publications/the-world-factbook/).

To help visualize the similarities and differences, we transposed the data and did a multidimensional scaling of the countries with the ALSCAL procedure. We used the values on the infrastructure variables to measure the distances between the countries. The stress value was .041 and R2 = .99. Figure 1 shows the plot.

Note that PROXSCAL is typically preferred over ALSCAL for multidimensional scaling because it is faster and the stress value is based on raw distances rather than squared distances. Nevertheless, the stress measures of the quality of the solution were similar, with PROXSCAL at .01 for S-stress. Nevertheless, we chose to report the results from ALSCAL because its graphing is better. Table 4 shows the coordinates of the countries on two dimensions.

There are two outliers, China, on the first dimension and Singapore on the second. Singapore is an outlier on the high end for mobile, and China on the low end on Internet development and mobile and landlines per capita. Taiwan and South Korea are highly similar, as is Japan. That high similarity, along with the high deviations of China and Singapore, produces a highly asymmetric plot. Other observations include that the three countries most ethnically similar -- China, Taiwan, and Singapore, comprising Greater China -- share a low level of broadband penetration. South Korea is the most advanced in broadband, followed by Japan.

Table 3. Media Development Indicators: Subscriptions per 100 Inhabitants -- 2016

	Lines	Mobile	Internet	Broadband
China	14	107	53	27
Japan	51	135	92	32
S. Korea	52	124	89	41
Singapore	34	144	81	25
Taiwan	5	122	88	24

Table 4. Coordinates of Countries on ICT Infrastructure

Country	Dimension1	Dimension2
China	2.53	.17
Japan	-.96	.02
South Korea	-.70	.39
Singapore	-.07	1.05
Taiwan	-.79	.48

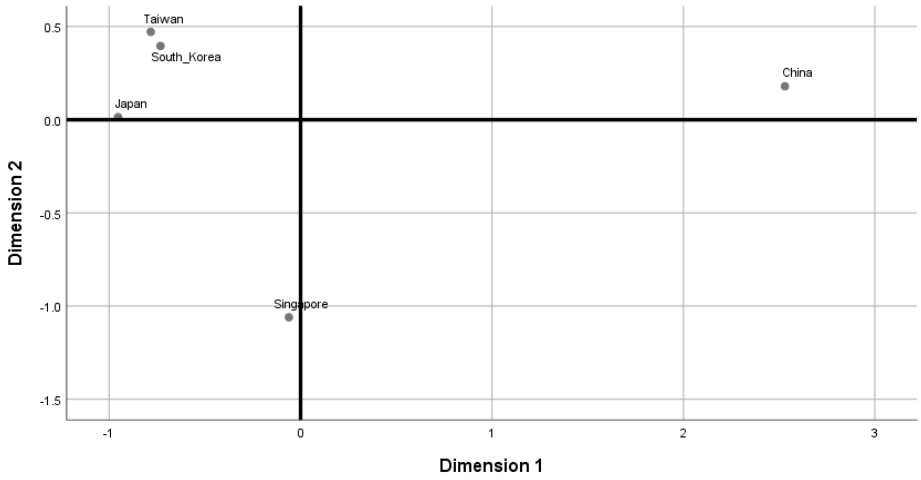

Figure 1 Multidimensional Scaling of Countries on ICT Development

Values Predictors of Internet Use.

Our interest is mainly in digital media. As one would expect, Internet use loaded with email and PC use across most countries, supporting the treatment of these media as a category. As the medium with the highest loading on the new media dimension, Internet use represents the dimension of digital media use as well or better than email or PC. It is our dependent variable for the linear regressions with the 18 values indices. Results that emerge from predicting Internet use may, therefore, generally apply to other digital media. Mass media use, per se, is not of primary interest here, so we have not done regressions with values for those media, represented most strongly by television.

For the regressions on Internet use, we entered the eighteen values indices as a block. Table 5 shows a summary of the results. Only two indices out of 18 were significant predictors at $p < .05$ for all countries except China: homosexuality acceptance, and gender equality in education. The rest of the values apply in three, two, or one out of five nations. We conclude that for Internet use, there are differences within countries. Membership in the Confucian cohort does not appear to be important. This analysis reaches the same conclusion as the media factor analyses. There are considerable media differences by countries in how their populations use them, and in what values predict this use.

Although possible similarities of values across the cultures, not tied to Confucianism, are not our primary concern, the two similarities, gender equality, and homosexuality acceptance are noteworthy. These attitudes are innovative relative to traditional values, and digital media are also innovations compared to traditional mass media. Digital media appeal more to early adopters, who typically have attitudes that reflect the edges of social change, which would include acceptance of homosexuality and gender equality. Because the older media seek to reach the widest segment of a population, if most members are traditional, the content of the media is likely to be traditional, because people generally attend to content that is consistent with their attitudes.

Table 5. Regressions of Values Indices on Internet Use

Singapore .362	**Taiwan .486**	**China .265**
Postmaterialism	Autonomy	Less Importance of religion
Choice	Conformity	Homosexuality acceptable
Nationalism	Trust in courts	
Devoutness	Independence	
Religious practice	Obedience	
Conformity	Gender equality in education	
Imagination	Homosexuality acceptable	
Obedience	Voice	
Gender equality in jobs		
Gender equality in education		
Abortion acceptable		

Japan .456	**South Korea .527**
Less Importance of religion	Postmaterialism
Less Trust in police	Less Autonomy
Less Trust in courts	Less Religious person
Imagination	Less Religious practice
Gender equality in jobs	Less Trust in army
Gender equality in education	Independence
Gender equality in politics	Obedience
Homosexuality acceptance	Gender equality in jobs
	Gender equality in education
	Homosexuality acceptable
	Divorce acceptable

Note: Numbers are multiple R values.

Discussion

Our results suggest that Confucianism does not have an observable effect on media use patterns. The findings of differences in values also rule out a technological determinism effect. The analysis of digital media infrastructure suggests that communication technology development may result in differences in the East Asian countries' media use patterns. There were considerable differences across countries, with China an outlier in low Internet and mobile penetration, and Singapore with high mobile use.

Regarding the dimensionality of media, four out of five countries had a more complex three-dimensional factor structure, but Singapore had a simpler two-dimension solution, with mobile loading evenly on a traditional media and a digital media dimension. This is evidence that mobile technologies may facilitate the convergence of media usage patterns, which reduces media channel entropy and increases content entropy (Danowski, 1974) fostering more exposure to diverse media content. In seeking to explain this dimensional pattern, we note that analysts consider Singapore to have the world's most digitally-connected society, with its omnichannel infrastructure (https://www.edb.gov.sg/en/our-industries/information-and-communications-technology.html).

Perhaps Singapore represents a more advanced state of ICT development than the other countries, which may be transitioning toward its patterns. If this were the case, then a long-range effect of communication technology evolution may be the simplification of communication. Convergence is an example of this reduced media channel variation. Such a trend would be an adaptive response to the increasing volumes of information and overload for some members of knowledge-based societies.

Simplification in media dimensionality is exemplified in the converging of more elements from other media into a unified stream. Consider an example of how the South Korean podcast series *Nakkomsu* (NKS) employed a hybrid media strategy and served as an alternative political force challenging the ruling conservatives during three elections in South Korea between December 2011 and December 2012 (Kim, Lee, & Park, 2016). "Twitter served as a space where individual listeners interacted directly with the podcast and fellow listeners—a space that podcasts themselves do not provide (p. 42)." The NKS encouraged a wide range of offline activities in which listeners were to participate in parallel with the podcast, such as books, public talks, and fundraising events. Perhaps in more advanced stages of technological development, these activities in different media become more integrated in the same omnichannel media ecosystem, resulting in over-time simplification of the communication process.

There is another notable difference among countries' Internet profiles. China is an outlier in having a low Internet and mobile penetration in 2016. This finding may account for there being only two significant values predictors of Internet use for it and explaining only about 7% of the variance. In contrast, South Korea had four times as much variance explained at 28%. Nevertheless, in absolute terms, values predict a rather small percentage of Internet use. Future research may investigate what accounts for the remaining variance.

The values findings open areas for future research that would seek to explain why these patterns occur. One avenue would be to study media content differences across these countries. Further research may find that values interact with content choices, which may result in media use

patterns. The message content may be a layer of the communication systems that links values to media channel use. Thus, analysis of media content would enhance theory development.

Conclusion

Our study has shown that analysis of East Asian countries' media dimensions use has theoretical value. We found that neither Confucianism nor technological determinism appears to produce uniformity in media use dimensionality. Not only is there variation in the number of dimensions, but in what media load on them. As well, there are differences in values tied to exposure to the Internet. In addition, our analysis suggests that developmental patterns in digital media may also account for the lack of uniformity in media patterns across the region. The findings point to the possibility that along the evolutionary path, convergence of media decreases their channel complexity, while increasing content diversity.

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